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The "Solicitor General" and the Passes—Correction.

Last week, page 527, appeared an editorial paragraph concerning somebody's more or less successful effort to swindle railroads in the United States by getting passes for the "Solicitor General" of the London & North Western Railway. We pointed out several reasons why no American railroad officer should have been misled by this attempt. Unfortunately, in the next to the last sentence our meaning was changed by a typographical error. We said: "The expression 'trip transportation' is not used in England. Mr. Harrison would have said 'pass.'" Some one injected a word, making us say that "Mr. Harrison would not have said 'pass'"; which must have made the matter a little obscure for anybody who took the trouble to read the paragraph.

Contributions

High Steam Pressures and Balanced Valves.

Atchison, Topeka & Santa Fe Ry. }
Topeka, July 24, 1900. }

To the Editor of the Railroad Gazette:

The articles you have recently published on the subject of piston valves, as applied to French and American locomotives, have been of peculiar interest to me. We have made extended tests with piston valves, both with and without packing rings, on this railroad, and have reached the conclusion that piston valves are what we can best use. They are being used on the last 10 consolidation engines built for this railroad, and will be used on 20 passenger engines, which you mentioned some weeks ago as to be built soon.

You published in the *Railroad Gazette* of June 16, 1899, Mr. R. F. Hoffman's report to me on the test of a four-cylinder compound engine. Later, Mr. Hoffman wrote his observations for publication in the *Railway Master Mechanic*. I have found no reason to modify anything said in either instance. We have made painstaking experiments, especially with the piston valve without packing rings. My determination to try this form of valve on locomotives seemed to be justified by the wide and satisfactory use made of it in marine work. We came out of a trial of more than a year of continuous use of the valve without packing rings, convinced that there is in its operation cause for much astonishment to those who have not taken the trouble to test its fitness for this work.

Valves without packing were used on the four-cylinder tandem compound locomotive throughout its trial against the simple locomotive in the test earlier mentioned. The work was done in a mountainous country and under conditions which are admitted to be the most trying for a compound locomotive. Notwithstanding, the compound engine, thus equipped, made a saving of 18 per cent. in fuel against the simple engine which had carefully maintained D valves. Had there been any great loss of steam because of the plain piston valves it is difficult to see how this saving of fuel could have been made on the New Mexico Division of this railroad. There was no coddling of the compound locomotive. On the contrary, I issued instructions which were calculated to give the compound locomotive somewhat the worst of the operations. The piston valves had been used constantly for more than four months when the performance which you have published was recorded.

In view of these facts and of the wide publication they have received, I was somewhat surprised to read in your abstracts of convention proceedings that a plain piston valve must necessarily "either blow or jam." Our experience has been that by careful fitting it will do neither of these things, to the extent of causing any material loss or concern, and will work for a surprising length of time, practically unworn.

In our latest engines we are using packing rings on the piston valves. The introduction of valves without packing is, naturally, a change so radical as to be received incredulously at this time, when the pace of industry is so swift that there is scarcely time for necessary experiment of any kind. However, I shall not be astonished if the plug piston valve later comes into quite common use on locomotives. There is so much gained in simplicity and effectiveness, reduction of first cost and renewal, by its use that a much greater steam loss than I have ever known to be chargeable to it at its worst could quite well be sustained and leave a paying balance to its credit, as compared with the average slide valve, operating under the conditions which we have to meet. Then, too, one broken ring on a piston valve may cost more than a great many slight steam leaks. Rings do break.

Giving due value to these several features it seems to me that the piston valve, or more broadly, the balanced valve of whatever description, is a matter of too great importance to be passed over lightly. The effort to obtain better balanced valves is worthy of the most serious attention of us all. With the high and increasing steam pressures of to-day the man who advances a thought to better control valve motion, however simple, however complex, should receive a most patient and earnest hearing.

John Player.
Superintendent of Machinery.

A Pipe in an Eye Bar.

Pittsburgh Testing Laboratory, Ltd., }
Chicago, July 30, 1900. }

To the Editor of the Railroad Gazette.

The accompanying photographs of a peculiar fracture, obtained from a full-sized eye bar test, may be of interest to the readers of the *Railroad Gazette*. The eye bar shown had an original section of 5 in. x 1⅜ in.

Fig. 1 is a side view of a portion of this bar after test. The part of the bar including the fracture was sheared off after the test. This figure shows the profile of the cup which formed in the center of the fracture.

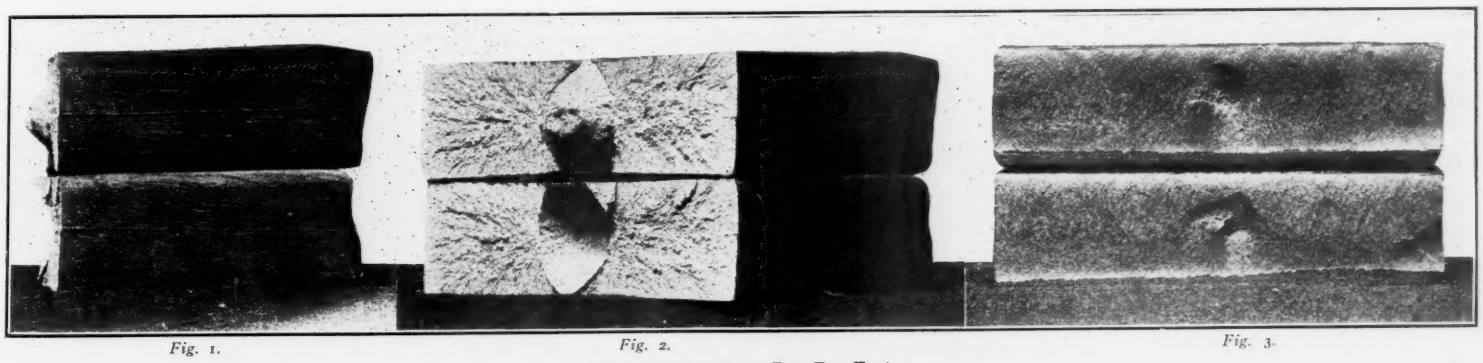


Fig. 1. Fig. 2. Fig. 3.

Some Results of an Eye Bar Test.

Fig. 2 shows clearly the character of the fracture with the cup portion in the center. The fracture was granular except the cup portion, which was silky.

Fig. 3 shows the sheared ends of the bar about 3 in. each side of the fracture, and from this view it will be seen that there was a "pipe" extending through the bar. Notwithstanding the "pipe" in the bar, and also the "lap" on the edge, which is clearly shown in Fig. 2, the bar had a tensile strength of 61,000 lbs. per sq. in., elastic limit of 35,000 lbs., elongation of 22 per cent. of 10 ft., and reduction of area of 37 per cent. at point of fracture.

The appearance of this fracture is interesting and peculiar, but does not indicate a poor quality of steel, in fact, the bar was of open-hearth steel, and, as the test showed, of very good quality. It would have been reasonable to suppose that the "pipe" would have caused a considerable reduction in the strength of the bar, but this does not seem to have been the case.

T. L. Condron,
Resident Engineer.

Trolley, Steam and Third Rail in Connecticut.

By Clarence Deming.

In our Eastern States, apart from the three great cities of New York, Philadelphia and Boston, four regions of considerable area are specially adapted for the study of the problems of street railway transportation. The four regions are Connecticut, New Jersey, Rhode Island and Eastern Massachusetts. In each of the four are most of the elements which make electric transportation in its physical, fiscal, civic and social evolutions both varied and instructive. In all of these territorial divisions have been capital quick to seek new investment, the antagonisms of highly organized and wealthy steam railroad systems, population, large absolutely, yet in many separate groups, and an extensive system of old horse railroads on which, as a kind of base line, the larger trolley systems have been built up. Any one of the four regions may be taken as fairly typical of the rest and in choosing Connecticut one only narrows the area of the study without losing many of its details or impairing much their separate and collective value.

From time to time during the last eight years there have been described in the *Railroad Gazette* various phases of trolley development in Connecticut. They have touched chiefly upon antagonisms, commercial and legislative, with the steam roads, litigation, taxation and the relations of the trolley companies to the Connecticut municipalities. Old aspects and situations need not now be reviewed. But it may be said that trolley history in the state, now nearing the end of its first decade, may be roughly divided into three periods. The first was marked by the electrifying of the old horse railroads, tentative steps in extension, and popular doubt and, at times and in places, hostility, to the trolley; the second period opened with a saturnalia of trolley construction, followed by fierce contests over projected parallels in the legislature and the courts, new statute making, and excursions of outside capital into trolley schemes, many of them highly watered; while the third period, but lately begun, has been characterized by interurban trolleys; to some extent recapitalization of the familiar "bond and bonus" type; third rail questions; matters as yet potential rather than actual, relating to express and freight business on trolley roads; and last in order, but greatest in moment, the swift consolidation of trolley companies in exact analogy to the earlier mergers of steam roads in the state and in the country. The features of the third period, in some respects just opening, form the general subject of this paper.

In the sharp conflicts of the New York, New Haven and Hartford (Consolidated) Railroad Company with the promoters of parallel trolley enterprises, the efforts of the great steam corporation were largely centered against the interurban trolley projects. So successful had its resistance been that up to a few years ago out of eighteen cities in the state only four were connected by trolley lines, and those from cities in two cases so contiguous that they formed, in effect, single municipalities. The change during the last four years, and particularly during the last two, is significant. Now, out of the eighteen cities in the state containing about 65 per cent. of the whole population of Connecticut, twelve have trolley connection with other cities. Six cities—Waterbury, Meriden, Danbury, Middletown, Willimantic and Putnam—are still segregated, and one of them, Willimantic, has, as yet, no local trolley system. Of the six segregated cities, moreover, Middletown is pushing for trolley connection with Hartford, Meriden for connection with Middletown, Waterbury and Meriden and a more important enterprise looks to the extension to Waterbury of the trolley system of the lower Naugatuck Valley. Within a year the tracks of the Bridgeport Traction Company have been extended to Shelton and, practically, to the cities of Ansonia and Derby, while the Norwich-New London trolley parallel, the cause of a long and picturesque contest reaching over several years, has just been opened for traffic. A few years more must undoubtedly find the interurban trolley system of the state complete so far, at least, as to leave no segregated cities. It has already advanced so far and at such a pace as to create a new situation and give rise to some suggestive problems in future rivalries of steam and trolley.

In meeting these interurban extensions the Consolidated Company has not been idle. Some of them, including one or two of the most serious, the steam company is still blocking in the State Legislature. The third rail has been used thus far only on the Highland Division from Hartford to Bristol, a distance of about 17 miles.

In one case, the connection between Bridgeport and New Haven, the Consolidated Company allowed the connecting trolley line to be built, relying on the crookedness and indirection of the route between the two cities. But its immediate policy is evidently the renewal of its old plan of "breaking" parallels by out and out purchase of trolley roads—illustrated within a few months by its reported and presumptive purchase of the Greenwich system and of the People's Tramway, of Killingly—the latter purchase not publicly announced but well assured, and of such a nature as to deserve its paragraphic description.

The People's Tramway Company began as a distinctively parallel enterprise looking to both passenger and freight competition with the Norwich and Worcester division of the Consolidated, essentially a freight division with low grades. The trolley charter was a liberal one, giving rights to build 31 miles of track, reaching 11 places, with 23,000 inhabitants, and to build to the Northern Connecticut staie line, connecting with a Massachusetts trolley system reaching south from Worcester. As a whole it threatened a complete parallelism from Norwich to Worcester with freight carrying as an important, if not primary, object. To avert the danger the Consolidated Company has bought out the whole enterprise; it is building a dam to supply a great water power to furnish motive power for the trolley, and light for the communities reached by its wires; it proposes, if necessary, to build to the state line to preserve its own territory; and freight service to the steam railroad stations on lateral trolley lines forms an important part of its plan, the seemingly paradoxical feature of which is a steam company's paralleling itself by trolley for the sake of controlling territory and preserving its own traffic. The results of this novel and homeopathic device, on a pretty large scale, of meeting trolley rivalry, will be most instructive, but will not, of course, be evident for some years to come. Meanwhile the Consolidated Company, at uncertain cost, certainly "protects" its Norwich and Worcester Division.

The consolidation of Connecticut trolley systems has gone on swiftly and surely, and at an accelerating pace. At the opening of the year 1893 there were 147 miles of street railway in the state. There are now about 490 miles. They are represented nominally on the schedules of the State Railroad Commission by 31 companies, but these, by consolidation, have, in fact, been reduced to 16 companies. Of the 490 miles of trolley track in the state about 130 miles are owned or controlled by the so-called "Young Syndicate," commonly regarded as identical with the United Gas Improvement Company, of Philadelphia; about 90 miles by the Fair Haven and Westville Company; and about 62 miles by the Hartford Street Railway Corporation, making 282 miles, or somewhat more than 57 per cent. of the Connecticut mileage controlled by three interests. The Consolidated Company owns a trolley trackage of about 42 miles which would give about 66 per cent. of the trolleys of the state now controlled by four interests and a far larger percentage were the values of the four trolley interests to be reckoned; and consolidation still goes rapidly on, carrying with it, in not a few cases, lighting plants and functions also.

In the long rivalries of electricity with steam in the state this merger of electric interests betokens new conflicts and new conquests. The steam corporation must hereafter meet in the legislature not scattered and divergent trolley forces, but centralized ones, backed in some cases by exotic capital, and powerful whether considered individually or apart. At least one of the large trolley combinations may be set down as very aggressive, planning extensions, some of them parallels, and almost necessarily relying in part on such extensions, together with possible freight and express business for returns on the large prices paid for acquired roads. Small economies in operation, blanket mortgages and stock bonuses hardly supply an intelligent motive in the trolley mergers. Ulterior aims which menace steam railroad interests and imply new contests may reasonably be looked for. The situation naturally touches state politics and partly "machines" closely, but that branch of the question need not be considered here.

Facts and figures supplied by the Consolidated railroad officers in regard to their lines electrified by trolley or third rail are more absolute than comparative. In 1897 the company opened its third rail line from Berlin through New Britain to Hartford, a distance of 12.3 miles. Before the new line was opened the steam road was running between New Britain and Hartford eight passenger trains each way daily, carrying about 750 passengers a week day at an average fare of 18 cents each way. Between the opening of the line, May 25, 1897, and Nov. 1, 1897, the new line carried 414,000 passengers at an average of 10 cents each trip, making trips every half hour from 6 a. m. to 11:30 p. m. each day. A daily average of 2,587 passengers for $258.70 a day, including Sundays, by the third rail thus compares with 750 passengers at $135 a day, for week days, only, by steam. The corresponding figures for passengers carried during the year succeeding the installation of the third rail were 1,060,617, as compared with 387,645 on the steam line; but the figures for money receipts are not given. It is to be noticed that the year referred to was the opening one when the "novelty" travel on the third rail undoubtedly added considerably to the traffic. A year later the third rail was extended some seven miles to Bristol, and the travel on the whole third rail system between Hartford and Bristol, for the year ending May 31, 1900, was 1,404,942 passengers, counting as two passengers a person traveling over two of the 10-cent reaches of the line. Receipts, therefore, for the year were $140,494.20, but, as the two years since the opening of the Bristol extension are not complete, comparative figures of the third rail traffic can not be given. The system has had considerable trouble during hard snow storms and worse trouble during ice storms, and has had to be reinforced by two auxiliary batteries; but it seems to have served its main purpose of preserving passenger traffic from the competing parallel trolley.

In this connection may be cited an increase of passenger travel from 304,292 to 702,419 on the Nantasket branch of the Consolidated Company during the first year of third rail operation. On the New Canaan branch during the first year of trolley service passenger traffic rose from 98,302 to 184,728, the fare under trolley and steam being the same.

The only figures supplied by the Consolidated Company for cost of operation are for the Hartford-Bristol system, 2 7-10 cents per train mile for labor, on the Nantasket branch 8 2-10 cents, and on the New Canaan branch (trolley) 6 3-10 cents, as compared in each case with 12 cents for steam. On the Hartford-Bristol system motor power costs 6 cents per train mile, on the Nantasket division 14 cents, and on the New Canaan branch 7 8-10 cents, steam motor power in the three cases ranging from 19 to 24 cents.

In a general way the signs indicate that the Consolidated Company is not relving so much as of old on the third rail to meet trolley rivalries. Certainly in Connecticut much less talk is heard than a few years ago about third rail extensions. As sustaining this view may be remarked the fact that the company adopted the trolley rather than the third rail for its New Canaan branch and will have the trolley also on its system for Providence, Bristol and Fall River. It is true that announcement has been made that a third rail will be used for the suburban lines of the Consolidated Company entering the Union Station at Boston, but it is to be a third rail of an entirely different type from that used on the Nantasket branch, or, thus far, in Connecticut.

The matter of the transportation by the Connecticut trolleys of property as well as persons is still in its primal stage, but has suggestive possibilities. The general street railway law of the state provides that the street railway companies may transport property but, in the case of merchandise, shall be subject to regulations of the Superior Court or any judge thereof, and his jurisdiction is apparently absolute, his orders, at his discretion, applying to the whole or a part of street railway lines. In practice there has been a minor private express line operating in Hartford and vicinity and a larger private enterprise operated over about 50 miles of the lines of the Bridgeport Traction Company and connections. This express system reaches from Bridgeport northward to Ansonia and Derby, westward to Noroton and eastward to New Haven, with deliveries three times a day in the larger places. It operates single express cars which seem to be well loaded, but the experiment is too recent to demonstrate success. An interesting point, already raised hypothetically, is whether this express or later freight service will be ruled by the state courts an additional servitude on the highway. The question, should express or freight traffic develop largely on the trolleys occupying highways, is sure to be taken to the state tribunals.

At the close of its first decade the Connecticut trolley still leaves some of the deeper economic and social problems which it touches unsolved. The "cross country" trolley has not expanded so much as was looked for a few years ago. While it has perceptibly in its immediate neighborhood raised the price of farm lands its area of farm influence has been so small as to produce no serious readjustment of farm values. In the cities the trolley undoubtedly has to some extent diminished the value of central and sub-central residences, while raising somewhat central business realty. Its most positive and visible effects have, naturally, been the development of suburban realty and suburban towns—a matter on which the coming returns of the census of 1900 ought to throw a strong light.

Union Automatic Block Signals on the Lackawanna.

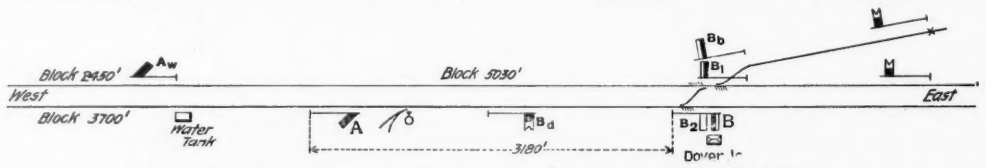
[WITH AN INSET.]

An account of the signaling to be done by the Union Switch & Signal Co. on about 40 miles of the Delaware, Lackawanna & Western was published in the *Railroad Gazette* of April 13 last. We have since received from Mr. Rudd, Signal Engineer of the road, a diagram showing the arrangement of these signals, which is given on an inset with this issue.

As before stated, the signals are semaphores, worked by electric motors, with the Union Co.'s latest design of metal post and protected bearings. From Dover to Hackettstown, 19 miles, there will be a distant signal for each block, the distant arm being placed on the same post with the home signal arm of the block section in the rear. The arrangement of track circuits is similar to that in the new work on the New York Division of the Pennsylvania, a polarized relay being used to change the position of the distant signal, thus doing away with line wires.

The semaphore spectacles are arranged for two glasses, red for stop and green for all clear. The signals are to stand normally at all clear instead of normal danger, as at first proposed; and we understand that all of the automatic signals on the Lackawanna are to be made normal clear.

At places where the existing switches are protected by manually operated signals, interlocked, the "electric slot" is used to insure the protection of trains by these signals as completely as by the automatic. For example, at Dover Junction all of the stop semaphores, except



Signals at Dover Junction; Delaware, Lackawanna & Western Railroad.

that leading from the eastbound track through the crossover, are equipped with electric slots controlled by the track circuits. Thus, a train proceeding from A towards B finds signal B clear for its passage on to C (1⅓ miles east of B) only in case the signalman has put it in the clear position; but the return of the signal-arm to the stop position, after the passage of the train, is accomplished by the operation of the slot, without the aid of the signalman. The presence of the train on the section B C de-energizes the magnet of the slot, and this breaks the mechanical connection between signal B and the lever by which it is worked. On the exit of the train from section B C the magnet of the slot is again energized, but the signal remains in the stop position until the signalman reverses the lever for that signal, restoring the mechanical connection.

The distant signal, Bd, is moved by an electric motor which is set in motion by a polarized relay in the track circuit. When signal B is cleared it moves a pole-changer, which reverses the polarity of the circuit in the rails between Bd and B, and this clears signal Bd. If, when signal B is cleared, a train is present between Bd and B there will, of course, be no current to act on the relay at Bd, and the arm of signal Bd will, therefore, remain in the horizontal position.

If Bd were a mechanical signal the home signal, B, might be set at "stop" by the passage of a train while the signalman, not being compelled to reverse his lever, could leave the distant, Bd, clear; or he might reverse his levers and then clear the distant, while not able to clear the home; hence the need of an automatic connection between the distant signal and the home.

In addition to the automatic control by the pole-changer on the home signal, the distant signal can at any time be put horizontal by the signalman, by means of a circuit breaker in the cabin, by which he can open the circuit which actuates the electric motor that moves the signal. This circuit breaker is interlocked in the machine, like an ordinary distant-signal lever.

The track circuit controlling signal A extends from Bd to A, and is controlled, through a relay, by the track circuit from B to Bd.

Signal B^2 has, of course, no connection with the automatic apparatus.

Signals Bb and B^1 are both held in the stop position by their slots whenever there is a train on the westbound track between B^1 and Aw.

Signals B^1 and Bb control their respective distant signals in the same way that B controls Bd.

The Life of Steel Rails.

In railway work, and light railways where the line is raised above the road level and not subjected to vehicular traffic, it would seem, as already incidentally mentioned, that the life of rails depends solely on the amount that can be worn off the face with safety, this being ⅜ in. to ½ in. for 70 lb. to 80 lb. rails in practice. Most authorities seem to agree with this, although Mr. W. G. Kirkaldy in a paper read before the Institution of Civil Engineers, on Jan. 17, 1899, pointed out that the action of the wheels on the rail face hardened the latter, and made it liable to become filled with minute cracks, which are very apt to spread and result in fracture. Still, the time that Mr. Kirkaldy gives before such hardening affects the safety of the rail almost coincides with that taken to wear off the safe limit of ⅜ in. to ½ in.; this latter depending to a very great extent on the situation of the rails, those in close proximity to the sea being more quickly affected by reason of increased oxidation. For this reason also different climates affect the life, as also do tunnels, or any positions in which gases or chemical fumes which are likely to attack the steel are prevalent.

Railway tracks are laid on cross sleepers of wood and iron, and a certain elasticity or cushioning effect is aimed at. This cushioning tends to minimize the hammer blow action of passing trains, and thus diminishes the wear and tear of both rails and rolling stock.

As is to be expected, rails wear out more rapidly on inclines than on the level, by reason of the extra grinding power exerted, and also of the wheels skidding when braked; this likewise applies, but in a more marked degree, to stopping places. On this point Mills, in *Railway Construction*, says that one-tenth of an inch was worn off the face of an 80 lb. rail on a level track in ten years, while a like amount was worn off in six years on the same line—and subjected to the same traffic—on portions having a gradient of 1 in 70 and 1 in 100.

On the London & Northwestern R. R. tests were made to determine the life of rails, and Mr. Price Williams draws

comparisons between iron and steel rails, the former having a life on the level of approximately 15,000,000 train tons, or 100,000 trains of 150 tons each, while Bessemer steel rails lasted 95,000,000 train tons. He concludes that on an average 50 ordinary trains per day will wear out a 70 lb. steel rail in 20 years. Other authorities set it down at 17 to 24.5 years, according to degrees of gradient or level track; or to put it otherwise, 20,000,000 train tons will wear 1-16 in. off the face under ordinary favorable climatic conditions, and allowing ⅜ in. permissible wear as a safe limit, this would give a total life of 120,000,000 train tons. The durability of iron under the same conditions is set down at 17,500,000 train tons, thus showing that one steel rail will outlast about seven iron ones.

Iron is now obsolete for rail purposes, but still the foregoing figures are of interest. Before the Bessemer steel process, whereby steel is produced at a very cheap rate, was invented, iron rails were universal. Sometimes a steel tread of about ⅜ in. to ½ in. in thickness was welded on to the face of the iron rails to take the wear, while the cheaper material formed the bulk and carried the weight. The method was used with some success, but, needless to say, trouble was encountered by reason of the steel face coming loose.

"Funk"—see minutes of the "Proceedings" of Civil Engineers, lxxxviii.—states that the average life of rails in Germany, on main lines having the heaviest traffic, has been estimated at 11 to 12 years. This seems very short, and would lead one to think he intends that at the end of that time the rails are reversed, those used being the double-headed type, thus giving a further wear of 11 to 12 years. On the Orleans Railroad, according to Caille—see minutes of the "Proceedings" of Civil Engineers, vol. lxxxviii.—after 20 years' wear, with an average traffic of 30 trains and eight shunting engines per day, rails were lifted for inspection from different parts of the line, some from the level straight, others from curves, and some from gradient of 1 in 25. The rails were still found to be quite serviceable.

A point noted, and which has been observed in other cases, is that the rails were not so much worn at the ends as in the middle by an average of .09 in. This would show that the cushioning of track before referred to, and the flexibility of joints, not only prevents some of the hammer-blow action, but minimizes it still further at the most important part, i. e., the ends, for in the case of tramway tracks laid without any view of flexibility it has been seen that the ends go very quickly, and wear much more than other parts of the rail.—*The Engineer (Lond n.)*

For much fuller information the reader is referred to *Railroad Gazette*, August 3, 1900, p. 526.

A Railroad in Madagascar.

The French colonial authorities have prepared plans for a railroad from Tananarive to Aniverano, in Madagascar. This project, it is thought, will suffice for the present traffic requirements, the continuation of the line to Tamatave being postponed till the country is more developed. The length of the line proposed will be 180 miles, meter gage rails 47.7 pounds per yard on steel sleepers, 2,000 to the mile. The sharpest curves will be of 164-ft. radius, and the steepest gradients will be 1 in 40. The highest point will be 4,850 ft. above sea level, the terminus at Tananarive being at an elevation of nearly 4,500 ft. The only important bridge will be that across the Mangoro, 328 ft. long, but there will be a dozen tunnels, of which the longest will be 820 ft. The plans provide for about 390,000 cubic yards of earthwork and 327,000 cubic yards of masonry in culverts, retaining walls, and the like. The trains will weigh about 75 tons, and be drawn by 24-ton locomotives, and a "commercial" speed of 12½ miles an hour is expected. About seven years, it is estimated, will be neeedd for the work. The French colonial authorities can be addressed as follows: Monsieur Le Ministre Des Colonies, Au Pavillon de Flore (Tuileries), Paris, France.

Some of the Recent Passenger Locomotives of the Pennsylvania Railroad.

Figs. 1 and 2 are photographs of the Class G-4 and Class D-16-d, 10-wheel and 8-wheel passenger locomotives of the Pennsylvania Railroad, in the order named. Class G-4 was shown in outline, and described, in the *Railroad Gazette*, Jan. 19, 1900, p. 35. Class D-16-d was first put in service about two months ago. Class E-1, to which frequent reference is here made for comparison, was described and illustrated in this paper in July, 1899, p. 487.

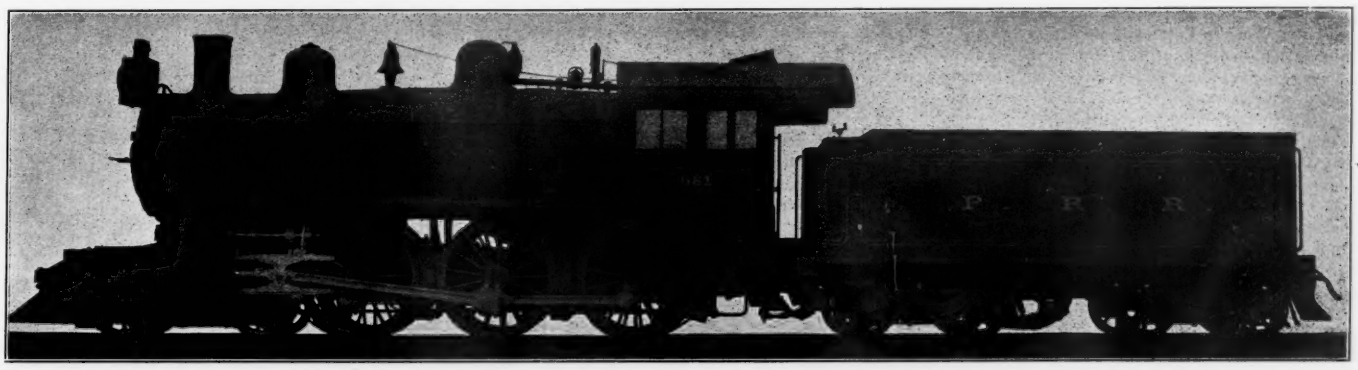


Fig. 1.—Class G-4. Ten-Wheel Passenger Locomotive—Pennsylvania Railroad.

Supplementing what has previously been published of Class G-4 it may be said that the cylinders are 20 x 28 in., the driving wheels 72 in. in diam., the steam ports 1¼ in. x 20 in., and the exhaust ports 2½ in. x 20 in. The travel of the valves, directly due to the throw of eccentrics, is 6 in., this travel being slightly increased beyond 6 in. in the forward motion, thus obtaining superior starting power in the go-ahead movement, as compared with the backing motion. The outside lap of the valves is 1 in. and they are set line and line, in full gear, in both motions. The tractive force at 80 per cent. of 225 lbs. working steam pressure is 28,000 lbs. The tractive force of the Class G-4 locomotive is, therefore, 38 per cent. greater than that of the E-1 class. There is an increase of 21 per cent. in the boiler pressure, 7.7 per cent. in the length of the crank arm and a decrease of 11 per cent. in the diameter of the driving wheels, as compared with the Class E-1. The latter locomotives are in fast and heavy service on the West Jersey & Seashore run, between Camden and Atlantic City. Both classes have readily performed all work that has been expected or required of them.

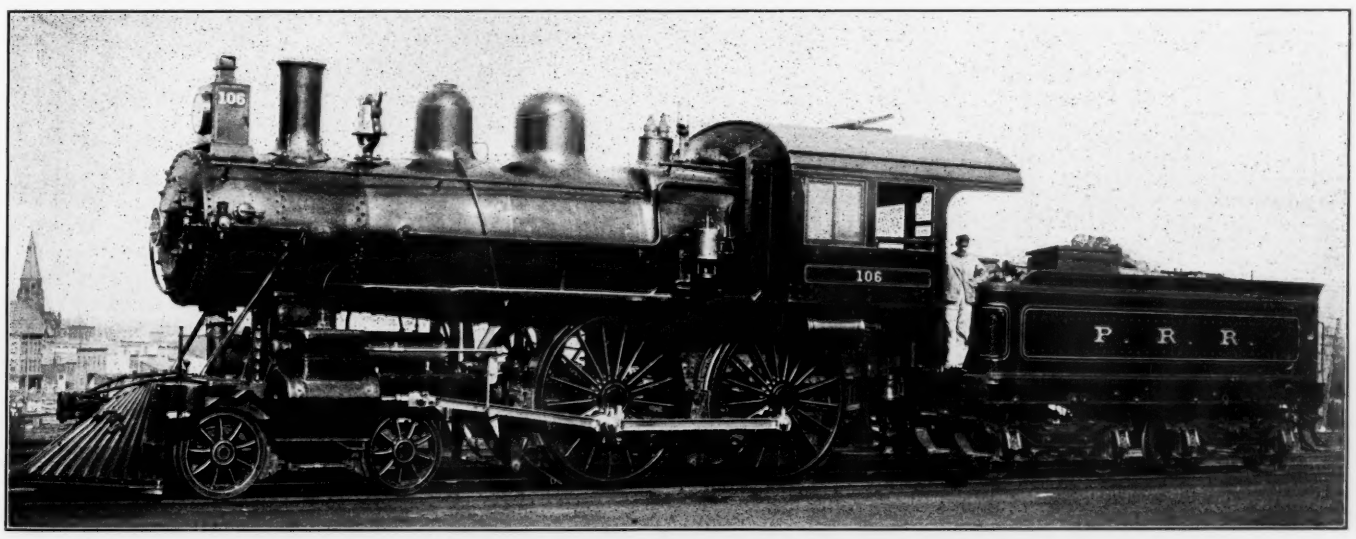


Fig. 2.—Class D-16-d. Eight-Wheel Passenger Locomotive—Pennsylvania Railroad.

Engine No. 700, Class E-1, has recently been in service on the New York Division hauling the St. Louis express, consisting of 12 cars, a total trainload of 950,000 lbs. This work has been very satisfactorily done. The locomotive burns anthracite coal in this service. Of the latest type, of which several were completed about two months ago, D-16-d, Fig. 2, there are some specimens on the New York Division. A number of these locomotives are also in service between New York and Long Branch. They are worthy examples of the good workmanship which is characteristic of the Juniata shops at Altoona.

For convenient reference it may here be said that the dimensions of the cylinders of Class D-16-d are 18½ x 26 in., driving wheels 80 in. diam., and boiler pressure 185 lbs. These factors are in Class E-1, 20½ x 26 in., 80 in. and 185 lbs., respectively.

The Transportation Show at Paris.

Electrical Installation of the Orleans.—We continue our notes concerning the transportation exhibits at the Paris Fair, freely translated from the *Journal des Transports*. A matter of great interest is naturally the installation of the Orleans Company for working the traffic over its new line between the Austerlitz station and the Quay d'Orsay. This, it will be remembered, is the underground terminal line of the Orleans by which it gets access to the heart of the city and to the Exposition region. It will be remembered also that the engineers of the Orleans Company visited America two or three years ago, and looked carefully into the development of the electric art as applied to transportation here, and decided to use locomotives built practically on the lines of those used in the Baltimore & Ohio tunnel. The civil engineering side of this extension we have described at considerable length in former issues, with illustrations. Concerning the electrical installation, the *Journal* says that it is complete in all the parts necessary to working a large and complicated traffic. The electric current not only handles the trains, which number about 150 a day (loaded and light), but also does the lighting, handles pumps for taking care of the drainage in the subway, and works motors for lifts, capstans, etc.

The energy is produced as a tri-phase current at 5,500 volts and 25 periods, at a generating station producing 2,000 kilowatts. The primary current is utilized directly, with or without reduction of tension, only for a few motors which run at steady speed. The electric locomotives, and the small motors of which the speed is variable, and the lighting plant (arc lamps and incandescent lamps) are all fed by a continuous current obtained by transforming the tri-phase current in three sub-stations. These sub-stations are situated at Austerlitz, at the Quay d'Orsay and at Ivry, the latter for lighting only. A battery of accumulators serves for regulation, and may eventually keep the trains moving in case of accident. This is made up of 260 elements of 1,100 amperes capacity, containing 350 kilograms of plates.

The current for the traction motors is distributed by third rails, which rest on wooden blocks dipped in bitumen, and these rest on the ties. These rails are bonded by two copper wires, each of 120 square millimeters section. These two conductor rails, one for the incoming and the other for the outgoing track, are united at intervals by means of two cables of 200 square millimeters cross section each. Thus the rail conductors are joined in parallel so as to distribute the current with practical equality and to reduce to a minimum the drop in tension.

For the signaling, which is very complicated at the terminal station, an overhead conductor is used. This is a "T" iron carried on wooden insulators. The return current is taken by the running rails.

Each of the electric locomotives (10.609 meters long) rests on two bogie trucks, each truck having two axles. Each of these axles is driven by an electric motor with toothed gear. The diameter of the driving wheels is 1.245 meters. The housing of the electric locomotive is inclined forward and back, in the way with which

Americans are thoroughly familiar, the cab being in the middle. These engines are supplied with Wenger compressed air-brake, also with hand brake and with air whistle. The motor for compressing the air is automatically controlled by the pressure in the reservoir.

Current is taken from the third rail by four shoes for each locomotive. A fifth shoe is also supplied to take current from the overhead conductor.

Each of the four motors on a locomotive has a minimum power of 125 kilowatts under a tension of 550 volts. These have been liberally designed to endure the heaviest overload, as, for example, in starting trains of 300 tons (not including the locomotive) on a grade of 1.1 per cent. near the Austerlitz station. The motors can be worked in groups of two in series, and then all four in parallel.

Compound Locomotives.—The Orleans Co. also shows a fast compound locomotive. It was only in 1899 that the Orleans Co. decided to adopt the compound for current use. The two types put in service have been designed from the experience of neighboring companies. The first type (engine numbers being 1 to 25 inclusive) are fast engines with two coupled axles, and one of these is shown at the World's Fair. These are the same type as the high-speed engines of the Southern. The freight locomotive adopted by the Orleans has three axles coupled, the engine numbers being from 1701 to 1725, inclusive. These are of the Northern type. Since putting these engines in service the Orleans has been able to increase its speed or to increase the weight of trains. The journey from Paris to Bordeaux has been reduced from 8 hours and 14 minutes to 7 hours and 5 minutes, the commercial speed being 82.52 kilometers per hour. The journey from Paris to Nancey has been reduced from 7 hours and 23 minutes to 5 hours and 23 minutes, the commercial speed being 79.3 kilometers per hour.

The Southern Railroad Co. (of France) shows three compound engines which are as remarkable for their elegance as for their power and construction. Engine No. 1765 is one of a lot of 24 engines built 1896 to 1898, and also served as the model for the new compound engines of the Orleans Railroad. These engines are especially designed for fast and heavy trains on lines with maximum grades of ½ of 1 per cent. running out from Bordeaux. They haul trains of 175 metric tons (not including locomotive and tender) at a mean speed of 62 miles an hour, and trains of 300 tons (not including locomotive and tender) at an average speed of 50 miles an hour. They have four drivers coupled 84 in. diameter and a bogie truck forward. The high pressure cylinders are outside the frames, and connected to the second driving axle, which is under the fire-box. The low pressure cylinders are inside and connected to the first driving axle. The dimensions are not given.

Locomotive No. 1301 is designed for service in country where the grades run heavier. They have to work grades of 1.5 to 1.6 per cent. over long distances, and there is one grade of 3.2 per cent. for 6.8 miles. On this latter grade these engines take a train of 125 tons at 18½ miles an hour. On a grade of 1.5 per cent. they take 160 tons at 34 miles an hour. They frequently reach 62 miles an hour on easier parts of the run. These same engines haul merchandise trains on those parts of the line having lighter grades, making 25 miles an hour with trains running from 650 to 700 tons. The same engines are used for fast express trains on the more level portions of the line where they haul 300-ton trains at 46 to 53 miles an hour. The engines of this class have boilers practically the same as those of the preceding class and cylinders of exactly the same dimensions. They have six drivers coupled 69 in. diameter and a bogie forward. The high pressure cylinders outside the frames are coupled to the second driving axle and the low pressure cylinders (inside) to the first.

The third type of locomotive shown by this company, No. 1,802, is a two-cylinder compound. It results from the transformation of an old six-wheeled coupled simple engine to the compound system. The first engines of this type (simple) were shown at the Exposition of 1867. The dimensions of the cylinders of none of these engines are given in the account before us.

Pressed Steel Cars for France.

The Pressed Steel Car Company is shipping to the Paris, Lyons & Mediterranean Railroad Company of France an order of 100 flat-bottom, gondola cars, and for several reasons, mechanical as well as commercial, these cars are of particular interest. The engravings show the construction and the general dimensions.

The specifications require that the car shall carry a load of 66,000 lbs. The clearances of the road are carefully expressed and the specifications require that the necessary low clearances must exist when the axles, wheels and bearings are worn so that the height of the body is lowered 1 31-32 inch. The maximum height of the center of the drawbar from the top of the rail when the parts are new and without load is 3 ft. 5 15-16 in. The minimum height after wear and with load must not be less than 3 ft. 1 in.

It will be observed that the car has double side doors opening outward, and when these doors are closed no point must project beyond the width of the car over the hinges.

The draft and buffing gear consists of a drawbar hook and coupling, shackle and two safety chains and spring buffers at the corners. The draw hooks, shackles and chains must conform to the specifications of the railroad and be subjected to a tensile test. If any part shows less than 26,400 lbs. it will be rejected. The draft spring is of one double coil spring applied directly behind the draw hook. The buffing spring is also one double coil spring, the capacity of which shall be 21,000 lbs. The truck springs are to be made similar to the Pennsylvania Railroad Class-H 23 springs except that the wire is to be 1-16 in. heavier. Groups of four springs are to be used on each end of the truck bolster. The chemical analysis of all material entering into all springs must conform to the Pennsylvania Railroad standard specifications and be subject to the inspection of a representative of the Pennsylvania Railroad Company, who will test the springs at the works of the builder. On each end of the car is one flat and one convex buffer head. These are of wrought iron, the buffer blocks of cast steel made to the standard of the P. L. & M. Company.

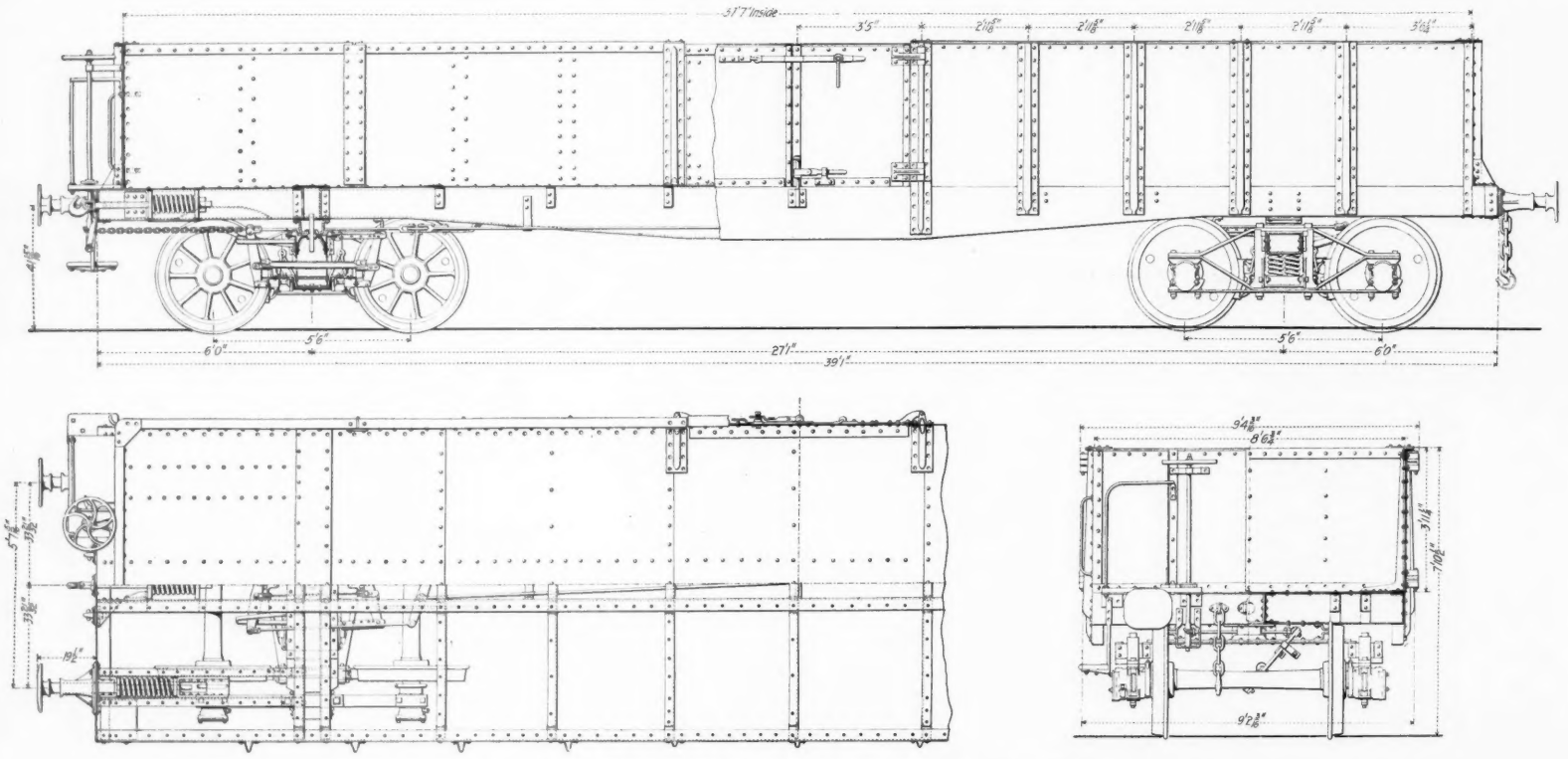
The cars are to be equipped with hand brakes on one end only and the leverage is such as to give a braking power of 90 per cent. of the light weight of the car when a force of 200 lbs. is applied to the brake wheel. The brake beams are of the solid pressed steel type as made by the Pressed Steel Car Company, mounted with heads to take shoes similar to the M. C. B. standard. The shoes are cast iron. The material of these brake-beams is also subject to inspection by a representative of the Pennsylvania Railroad Company.

The truck is the common arch-bar type with metal spring plank and is designed to carry a load of 66,000 lbs. in addition to the light weight of the car. The wheel centers are wrought iron and the tires are steel, from 2 5-32 in. to 2 5-16 in. thick. The axles are of open-hearth steel conforming to the P. L. & M. specifications and subject to the inspection of a representative of that company at the builder's works. The journal bearings are of bronze and white metal (tin, antimony and a little copper). The journal boxes are of malleable iron, dustproof, with sufficient capacity to hold 1.585 quarts of oil.

All springs, castings, forgings, steel plates, angles and bar iron must conform to the Pennsylvania Railroad standard specifications and are subject to inspection and test at the builder's works by a representative appointed by Mr. Casanave. Test pieces bearing the heat number must be sent to the testing department of the Pennsylvania at Altoona. Copies of all orders for materials made in the United States for these cars must be sent to Mr. A. W. Gibbs, Assistant Mechanical Engineer of the Pennsylvania at Altoona.

The cars are delivered on the wharf at Marseilles, the P. L. & M. Company paying only French customs duties.

The cars are shipped in sections as follows: Sides, four lots; doors, one lot; ends, two lots; underframing, one lot. The trucks are to be shipped, assembled and fitted complete so that they may be run immediately after landing without erecting labor. The cars are assembled at the works of the builder with assembling bolts temporarily joining the sections, the specified sections being, of course, fully riveted. The Paris, Lyons & Mediterranean Company merely assembles these various shipping sections as indicated above and does no other riveting than is necessary for such assembling. The Pressed Steel Car Company sends out a foreman to supervise the erection of the cars and furnishes also the necessary materials such as bolts, rivets, etc., for erecting complete.



A Pressed Steel Car for the Paris, Lyons & Mediterranean Railroad.

London Underground Electric Lines.

Considered from the directors point of view the electric traction experiment on the Metropolitan and the District has been successful, and many important data are now at hand which it was thought necessary to obtain before the entire conversion should be undertaken. The board has now taken another step in the matter, for in the last half yearly report it is stated that a committee consisting of three members from each of the boards of the companies has been appointed to consider the question of applying electric traction to the working of the inner circle. It has been agreed between the companies to invite eminent electric traction firms to submit plans and specifications, with detailed estimates and tenders for the necessary installation.

The City & South London Railway's report to June 30 shows the declaration of a decreased dividend. It has only been possible to pay 1¼ per cent. per annum on the consolidated stock, which is about 1 per cent. less than the rate for the past two years. The reduction is not, however, likely to be a permanent one, being due to the much increased debenture and preference capital required for the extensions. The interest on such stock has had to be paid from a total profit which has not yet been increased to any great extent by new receipts from the Clapham and Moorgate street extensions which have been open only a few months. These two sections now being in full working, the receipts should set the dividend right again, and when the great Islington extension opens about March next year, the good dividend days should dawn. As to this last extension both tunnels are nearly completed, and the stations are progressing.

A New Triple Valve.

The accompanying engravings show the design of a new freight triple valve and high-speed brake attachments patented by Mr. M. W. Hibbard, of Chicago, and assigned to Mr. R. FitzGerald, Vice-President and General Superintendent of the Chicago Junction Railway. One patent, No. 619,481, is dated February 14, and the other, No. 644,356, is dated February 27, 1900. A number of these valves have been made and a rack of 50 triples has been installed in the roundhouse of the Chicago Junction. The M. C. B. Committee on Triple Valves has had a preliminary investigation made, and the new valves will probably be tested by that committee in the near future.

Referring to Fig. 1, it will be seen that these triples can be applied to the standard brake apparatus, and the train pipe connection is made in the usual manner. The strainer is fixed with its apex toward the entering air, and just in advance of the seat of the strainer is a passage to a dirt chamber. The air enters passage 27, and passes into chambers 3 and 4. From chamber 3 air passes the usual by-port around piston 8 to the auxiliary reservoir, and from the inner side of piston 8 a passage 26 leads to the chamber on the inner side of piston 13. The stem 14 of this piston forms the service or graduating valve, and is surrounded by the emergency valve 18, which is seated on the bushing, 20. Around the emergency valve and stem 14 is a collar 21, which lifts the emergency valve from its seat when piston 13 makes its full travel. A passage, 23, leads from the strainer to the seat of the emergency valve, and in this passage is a check valve, 24. Piston 8 is the releasing piston, actuating the release slide valve 9, and controlling the release of the brakes through passage 12 and the recess in the

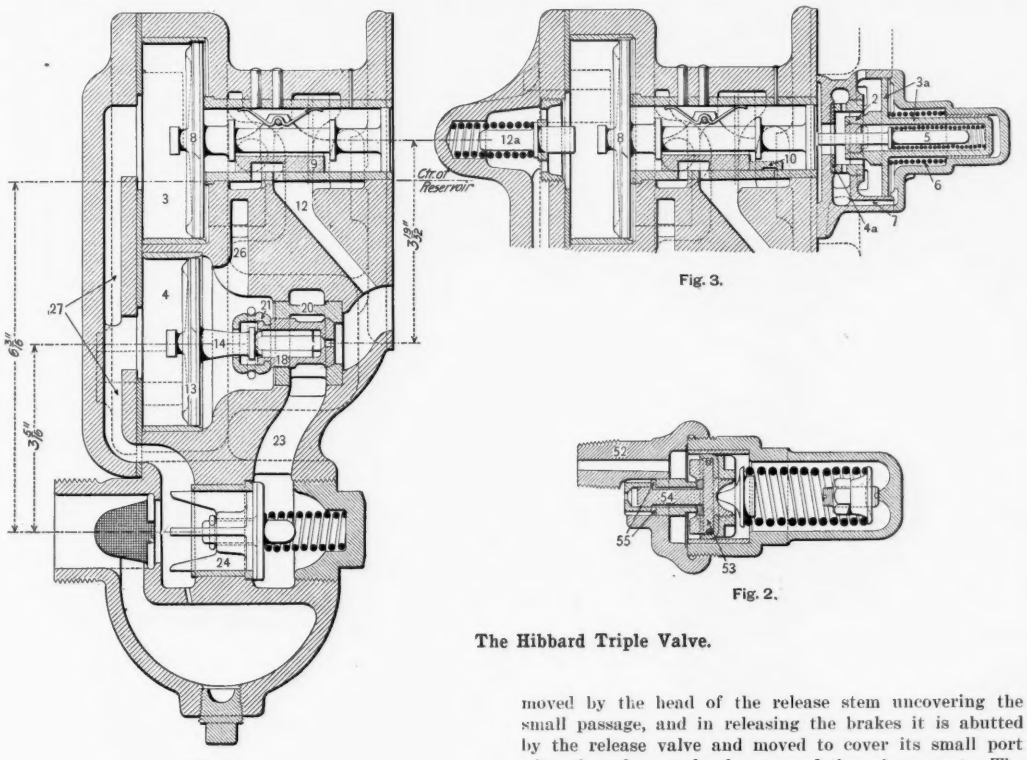


Fig. 1.

Fig. 2.

The Hibbard Triple Valve.

valve. These parts make up the entire device for ordinary train braking.

In operation a service reduction being made in the train pipe pressure, the release piston moves its full travel and closes the release, and this reduction also moves piston 13 outward, and unseats the service or graduating valve, so that air passes to the brake cylinder; when the reservoir has been reduced slightly below train pipe pressure, piston 13 moves inward and seats the service valve. A succession of train pipe reductions equalizes the pressures as usual. When a 10-lb. reduction is made in the train pipe pressure, piston 13 makes its full travel and lifts the emergency valve from its seat, and the train pipe air flows through passage 23 and past the emergency valve to the brake cylinder. The full travel of piston 13 also draws the emergency valve to such a position that the cut-away part on its outer rim is beyond the bushing 20, so that reservoir air flows around and past the outside of the valve to the brake cylinder; on a restoration of train pipe pressure the parts assume their normal position and the brakes release. The proportion between the piston 13 and emergency valve is such that the valve is not lifted from its seat before a 10-lb. reduction is made in the train pipe pressure.

The high-speed attachments, shown in Figs. 2 and 3, are not necessarily a part of this apparatus, but can be applied as well to the standard air-brake if desired.

The brake cylinder pressure regulator is shown in Fig. 2. The plug 52 is screwed into an oil hole in the brake cylinder, and there is a passage through the plug leading into the chamber of the device. In this chamber is a piston, 53, with its stem, 54, extending downward into a bushing, and the upper end of this bushing forms a seat on which a valve in the face of the piston seats. The stem 54 is reduced in section in its upper part, but fits the bushing snugly below the passage 55, which leads to the atmosphere. A spring holds the piston seated on the bushing, and at the upper end of the spring is a set screw for adjusting the tension. In operation, when the brake cylinder pressure has reached 50 lbs., the pressure on the face of the piston lifts it and unseats the valve from the bushing and reduces the pressure through the passage 55; when the pressure is slightly below 50 lbs. the spring seats the valve on the bushing. When an emergency application is made the piston makes a further travel, bringing the larger and snugly fitting part of the stem 54 so as to cover passage 55, permitting a slow reduction of the brake cylinder pressure.

The part shown in Fig. 3 is fixed to the inner end of the valve, and when in position extends into the auxiliary reservoir. It consists of a casing in which works a piston 3a, which is mounted on a hollow stem whose lower end forms a valve, 2, this valve having a rubber seat, 4a. Within the hollow stem of the piston works a stem, 5, surrounded by a spring, this stem abutting the stem of the release piston. It is of such a length as not to permit valve 2 on the end of piston 3a to seat in service action, but permits it to seat in emergency action, and is so constructed as to travel inward to permit the release piston stem to move to full release without lifting valve 2. A spring, 6, surrounds the upper part of the hollow stem of piston 3a, and causes the piston to move downward in emergency action and seat the valve 2 after equalization is obtained between the brake cylinder and auxiliary reservoir, thereby cutting off the auxiliary reservoir from the release valve chamber. A passage, 7, leads from the upper side of piston 3 through the casing to a point below valve 2. A small slide valve, 10, is shown on the seat of the release valve, and this valve covers a small port leading to the brake cylinder; this valve does not move in service work, but in emergency is

Fig. 3.

moved by the head of the release stem uncovering the small passage, and in releasing the brakes it is abutted by the release valve and moved to cover its small port after the release valve has opened the release port. The stem 12a and its surrounding spring is to differentiate the movement of the piston 8 in service and emergency.

In service work the triple valve performs the same functions as it does without these attachments, and the pressure regulating device Fig. 2 permits only 50 lbs. pressure to obtain in the brake cylinder.

In the emergency action all the parts of the triple act as previously described. The release piston in making its full travel moves the small valve 10, uncovering its port, and the release piston stem travels sufficient to be clear of the stem 5 of Fig. 3. Valve 2, however, does not seat until equalization between the auxiliary reservoir and brake cylinder has occurred. The air on the upper side of piston 3a escapes through passage 7 to the brake cylinder, and this chamber being so much smaller than the auxiliary reservoir the pressure above the piston 3a is less than the pressure below it, so the valve remains unseated until equalization has occurred. Then spring 6 seats valve 2, closing the auxiliary reservoir from the release valve chamber. In this emergency action piston 53, Fig. 2, moves upward by reason of high pressure, and the larger part of its stem will pass the ports 55. This will cause a slow reduction of pressure in the brake cylinder proportioned to the decrease of speed of the train. This operation reduces the pressure in the release valve chamber by reason of the small passage controlled by valve 10 being uncovered, but it does not reduce the pressure in the auxiliary reservoir by reason of valve 2 being seated. To release the brakes the train pipe pressure is brought to a slight excess over the brake cylinder pressure when the brakes release. The small valve 10 keeps communication open between the release valve chamber and the brake cylinder until the release port has opened, and when the train pipe pressure is brought up to the reservoir pressure valve 2 opens. The attachment shown in Fig. 3 is designed to insure a prompt release of all the brakes with the reservoirs cut off. Brakes which release quickly will not have their reservoirs open to be filled before the train pipe pressure can be increased to release the sluggish brakes.

Rail Steel.

Among the questions laid down for reports at the International Railroad Congress is "Hard or soft steel; relation between the hardness of rails and that of tires; means to obtain the homogeneity of the metal in heavy sections; most suitable length of rails; wear and deterioration; wear and oxidation in long tunnels and along the seashore, and technical conditions of manufacture." On this subject Mr. P. H. Dudley has presented a report for the United States, which is voluminous and detailed, and concerning which we shall have something to say later. Meantime, we print below the greater part of the report for all countries except the United States. This is drawn up by MM. Bricka, Inspector General of Colonial Public Works, Member of Committee, Railway Department, Ministry of Public Works, France, and Poulet, General Manager Southern Railroad of France. Mr. Bricka reports for the Continent and Mr. Poulet for Great Britain and the British Colonies.

Continent of Europe.—The superiority of hard steel over soft steel is now acknowledged universally. Soft steel does not resist the locomotive wheel-loads in actual use, nor does it stand the heavy traffic on main lines. The metallurgical progress made enables hard steel of good quality to be obtained without difficulty; brittleness, which was the only objection to its use, is no longer to be feared. According to the answers which we have received, the minimum hardness allowed (except in certain cases where reasons of economy lead to the use of softer metal), is that which corresponds to an ultimate tensile strength of about 65 kilograms per square millimeter (41.3 tons per square inch); on certain lines, particularly in France (Paris, Lyons & Mediterranean, Orleans, Western, Northern and State Railways) very hard steel, having an ultimate tensile strength of at least 70 kilograms per square millimeter (44.4 tons per square inch) is used. The Austrian Kaiser Ferdinands-Nordbahn also goes in for using very hard rails. We may here remark that the basic process, as well as the acid one, now enables hard steel of good quality to be manufactured; it is used on a large number of lines, and the only cases where its use has led to bad results refer to old steel when the process of manufacture was still a defective one.

At the end of this report, we show the cross-sections of rails produced by the basic process, which have carried about 450,000 trains at stations where all trains are stopped by the action of continuous brakes. These rails, which weighed 44 kilograms per meter (88.7 lb. per yard) have had up to 27 millimeters (1.063 inch) worn off the head without deterioration.

The information with which we have been supplied does not enable us to establish any relation between the hardness of rails and that of tires. In both cases, the metal used was the hardest which did not endanger the safety of the traffic that could be produced by the processes of manufacture in use. The ultimate tensile strength of the tires was as a rule 65 to 70 kilograms per square millimeter (41.3 to 44.4 tons per square inch); but in the case of locomotives and vehicles intended for express trains it was often greater, up to 85 kilograms per square millimeter (54 tons per square inch). In the case of rolling stock used for slow trains, on the other hand, it only amounted to 50 to 55 kilograms per square millimeter (31.7 to 34.9 tons per square inch) on certain lines.

The answers we have received do not contain any information on the subject of the means of obtaining homogeneity of metal in heavy sections. The management of the Swiss Jura-Simplon Railway, however, expresses the opinion that it is probably necessary to increase the hardness of the metal (percentage of carbon) if the cross-sections are increased; in support of this opinion, it quotes for instance of the 41 kilogram (82.7 lb. per yard) rails used by them. These rails were manufactured by the same process as their lighter rails, and the steel had the same ultimate tensile strength; nevertheless the steel was less homogeneous, appeared to be strained, and wore away more quickly.

We think that it is probable that the same result would be obtained without altering the composition, if more powerful rolling machinery were employed and the shape of the cross-section modified. It appears difficult to attribute the superiority of the outer skin of the metal to any other cause than to the rolling. If the power of the rolling mill is not increased in proportion to the increase in the cross section, the quality of the rail must suffer; the interwelding is less perfect, and as the manufacturer is compelled to complete the rolling before the rail becomes too cold, he is not so well able to carry out the rolling at the best temperature.

Railroad managements generally leave the technical conditions of manufacture to the discretion of the manufacturer. A certain number of managements are satisfied with specifying certain tests (bending by pressure or by blows, tension); others specify certain conditions of manufacture, such as process (whether acid or basic), composition of the metal, size of ingot, shape of ingot, cropping the rails by a given amount, etc.

As far as the process of manufacture is concerned, there is a tendency (as already mentioned) to remove the restrictions which were formerly placed on the use of metal produced by the basic process. The steel is generally manufactured in a converter, except in Austria,

where the Martin process seems to be preferred. On the other hand, there is a tendency to attach increased importance to the specification and tests of the chemical composition. The chief object of these specifications is to fix a minimum percentage for carbon (0.3 or 0.4 p. c.) and a maximum percentage for phosphorus (0.1 p. c.). It is much disputed whether it is of any use to specify for metal of a given chemical composition. Professor Tetmayer, of Zürich, has expressed the opinion (see Bulletin of the International Railway Congress, July, 1897) that no such conditions should be inserted in the specifications, until methods have been worked out to a sufficient degree of accuracy, until the way in which test pieces are to be taken and the methods of analysis to be employed have been settled, and until we know the effect of the different constituents on the strength and on the hardness. These remarks, in so far as they refer to conditions in the specification for accepting or rejecting metal on chemical tests, appear to us to be quite justified. All engineers who have had the opportunity of examining the results given by tests of this kind know how different the results obtained from the same test piece may be if different methods of analysis are used, and how test pieces of the same rail, even if taken from portions very near to each other, may give very different results. It is, however, none the less true that the results of analysis may give valuable information, not only so far as the elements which give the steel hardness are concerned, but also, if sufficient analyses are made by one and the same well-selected method, so far as the regularity of the manufacture and the homogeneity of the metal are concerned.

The size of the ingots, the shape of the ingot moulds, and the minimum amount to be cropped, are specified by a certain number of managements. As far as the means for avoiding the formation of blow-holes are concerned, the majority of the managements do not think it their business to occupy themselves with the subject. A number of railroads have tried the etching test. The Swiss Jura-Simplon, the Paris, Lyons & Mediterranean, the French Western, the French Northern, and the French Eastern Railways state that they were unable to obtain conclusive results by this method. On the other hand, the Austrian Kaiser Ferdinand's Nordbahn states that according to their experience it gives very valuable information on the homogeneity of the metal. This latter opinion agrees with that of Tetmayer, which has already been quoted. The latter authority is even much more decided on the question of the information which microscopic examination of the rails can supply. "If we examine the etched surface, we shall be able to conclude how the rail will probably behave when subjected to the bending test; whether, inside the permissible limit of wear, the rail will wear uniformly, or whether on account of irregularity of texture in the running surface unequal wear is to be expected; whether the rail has any tendency to form longitudinal cracks, or to exfoliate. We shall furthermore be able to predict the probable time at which such an event will happen, or to decide that no such event will happen."

Taking the doubts expressed by the above-mentioned managements into consideration, we are not able to accept finally the very definite statements made by Tetmayer. But in any case it is clear that the microscopic examination is able to give much assistance in checking the quality of rails; the method has already given very remarkable results in the investigation of the composition of steel, and as von Dormus and others, in America, have proved, it has given information of the highest interest on the texture of rails.

Great Britain and Colonies.—The types used, their length and their weight vary a good deal; but the ones most generally used are bull headed rails 300 ft. long. There is here also a tendency to increase the length, and there is a preference for rails 36 ft. long. Some 40 ft. rails are also used. The weight ranges from 45 lbs. per yard on certain colonial lines, to 92 lbs. per yard on some English lines. We are, of course, only speaking of the companies who have supplied us with information.

Some companies do not appear to specify any definite tensile strength; but most of them do, and there is a very fair general agreement in the ultimate tensile strength required, which varies from 40 to 50 tons per square inch and is 45 tons per square inch in the majority of cases. Only three companies among those who have answered are satisfied with a lower ultimate tensile strength; these are the Great Northern of Ireland, 33 tons per square inch, the Isle of Man Railway, 35 tons per square inch, and the East Indian Railway, 35 tons per square inch. Several companies specify, besides the tensile strength, an elongation of 15 to 20 p. c. for 40 to 45 tons steel; and one of the answers supplied to us, the elongation is 11 p. c. and the corresponding ultimate tensile strength 48 tons per square inch.

All the companies use either Siemens-Martin or (more generally) Bessemer steel, prepared by the acid process; the basic process is not used.

Only a few of the companies specify chemical composition, but they agree fairly well in their demands. The percentage limits required are:

Carbon	0.35 to 0.50 per cent.
Silicon	0.06 to 0.15 "
Sulphur	0.06 to 0.08 "
Phosphorus	0.06 to 0.08 "
Manganese	0.80 to 1.00 "

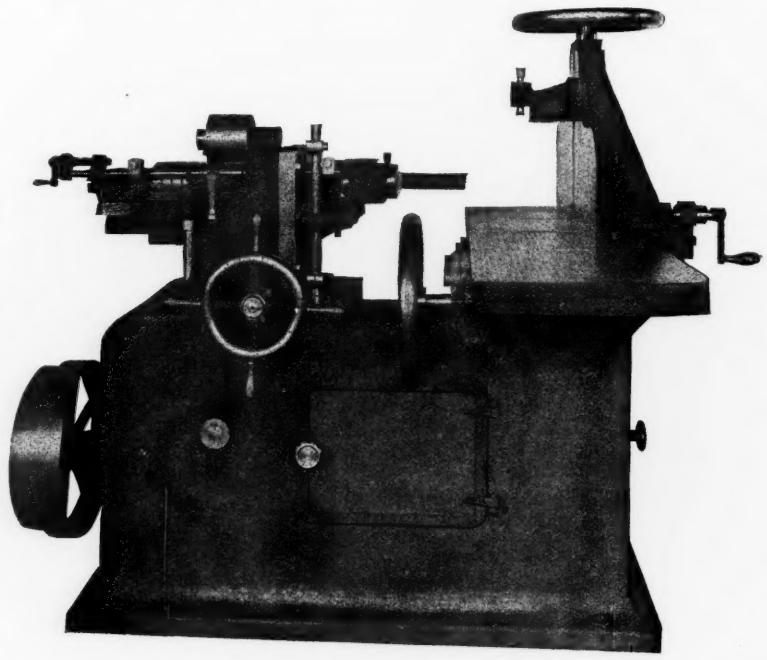
Some of the companies leave the technical conditions of the manufacture to the discretion of the manufacturer, and are satisfied by the results of the test made; others, on the other hand specify certain precautions that are to be observed during manufacture. The principal object of these precautions is to obtain homogeneous ingots by hammering and re-heating; to have the ingot sufficiently large so that rails of the cross section and length required can be rolled out of them, leaving sufficient over at each end to enable any doubtful metal to be removed by cropping; and, finally, to obtain after cooling sound straight and homogeneous rails of unstrained metal of the cross-section desired.

No company informs us of any special prescriptions to avoid the formation of flaws and blow holes; almost all of them add that such prescriptions appear to be practically useless and that the best thing to do is to trust to the practical experience of the manufacturer.

Some of the companies do not draw up detailed specifications, but merely state that the manufacturer is to carry out such tests as their inspectors prescribe, without specifying whether these tests are mechanical or chemical. A good many companies, on the other hand, while leaving their inspectors a free hand, specify certain definite tests, such as tensile tests or drop tests, giving the length of the test bars or test pieces, the regular weights to be dropped, the height from which they are to fall, etc. The drop tests are very generally specified; there are great differences in the ways these tests are applied. The lengths of the test bars, the weights to be dropped, the heights from which they are to fall, the number of blows, their distribution, and the effects they are to produce, all vary widely. It appears impossible to us to deduce any information of practical value from the data supplied. Some of the companies require analysis to be made. None of them specify microscopic examination after etching.

An Automatic Hollow-Chisel Mortiser.

The S. A. Woods Machine Co., Boston, Mass., manufacturers of high-grade wood-working machinery, especially adapted to the requirements of railroad and car shops, have lately brought out an automatic hollow chisel mortiser, illustrated herewith. It is the latest form of horizontal machine, and is of superior quality and workmanship. The base is a heavy, single-cored casting, 4 ft. 3 in. x 2 ft., and contains the feed mechanism by which the automatic portion of the machine is controlled. Unlike many of the mortisers of this type, heretofore produced, the table is firmly supported by the base casting, which is of sufficient size for this purpose. The table is 4 ft. 6 in. long and wide enough for clamping timbers 12 in. square. It is fitted with an improved fence, with holddown and stop, and has parallel adjustment operated by crank and screw across the table. An improved system of stops is also provided, by which mortises may be located with the machine. An end movement of 18 in. is provided for the table.



The Woods Automatic Hollow-Chisel Mortiser.

A feature of special value is the vertical adjustment of the chisel carriage or ram, supported by rigid and substantial uprights. It has a vertical movement to a height of 11 in., operated by pilot wheel. The stroke of the ram or carriage can be easily regulated while running, and has capacity for mortising up to 9½ in. in depth. The same style of frictions, that have been successfully used on other mortisers built by this company are used in this machine. Other features worthy of mention are the patent pneumatic pulley, with spirally grooved face, as applied to the boring arbor, which prevents air-cushioning and increases the belt power. A suitable counter-shaft is also provided, equipped with patent, self-oiling, loose pulley, which is a feature of economy, in time, oil and attention. The tight and loose pulleys are 12 in. diam., for 6 in. belt. Cone pulleys are provided, by which two rates of feed may be obtained as required.

The range of the machine is to mortise from 5-16 in. to 1½ in. The weight of the machine is about 4,000 lbs. It is particularly useful for railroad repair shops, and car-building establishments, and to those engaged in the construction of street cars, agricultural implements, or any other line where general framing or mortising is done. Further information desired will be furnished by the manufacturers, 64 Wabash avenue, Chicago, or South Boston, Mass., U. S. A.

A New Russo-Chinese Railroad Scheme—Samarkand to Hankow.

The following article we take from the Moscow *Russian Gazette:*

"The trans-Siberian Railroad will directly connect St. Petersburg and Moscow with the Pacific, but will not lead into the interior of China. It will develop Siberia, the rich and fertile agricultural districts of the Amur Province and Manchuria; will open the shortest route from Europe to Japan and Korea, and will improve direct trade between Europe on the one hand and Polynesia, and the Chinese and Indo-Chinese coasts on the other. But it will not afford a direct entrance into the rich provinces of Western China. To connect Eastern Siberia, the Amur Province and Manchuria, a railroad extending to the Gulf of Pe-Chi Li will some day become an absolute necessity. Russian foreign commerce will have to consider a railroad to bring the great centers of the Russian industry into direct track with the commercially important provinces of Hoang-ho and the Yang Tse Kiang Valley, as the most important point of future railroad politics. A road must be built into the interior of China which Great Britain will never be able to control, and this must be a road parallel to the trans-Siberian system.

"A Russo-Chinese railroad must not, as the Siberian, only have strategical purposes in view, but it should be devoted entirely to commercial interests. Any appearance whatever of military or political intentions would make the building of such a line impossible, as it would only be built with China's consent, as was the case with the Ussuri Railroad. The Russo-Chinese railroad, in order to be a success, ought to run from the greatest commercial centers of Eastern Turkestan to the great commercial centers of the Western provinces of China. It would most probably take the following route of which the direction only can be roughly indicated; from Samarkand to Hankow, or, in reality from St. Petersburg to Nanking. From Samarkand it would first lead into the deep valley of Kashgar, which possesses a semi-tropical climate, in which southern fruits flourish.

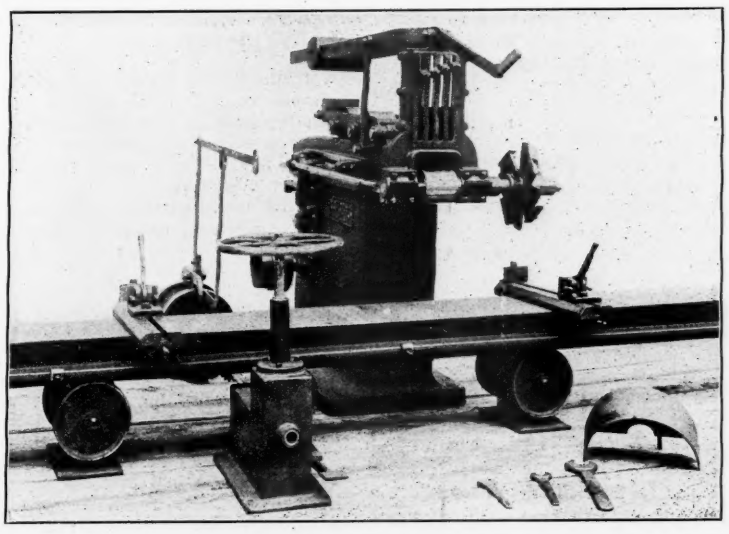
"From this center of the transit trade between Eastern Turkestan and Russo-Central Asia, a city of some 70,000 inhabitants, the road could go either along the wide valley of the Tarim River to Lobnor, or from Kashgar in a southeasterly direction to Jarkand, thence, continuing in a southeasterly direction to Chotau, then eastward to Tschertschen, whence it would proceed to Lake Lobnor and to Tschaklyk. From there, probably through the valley of the Tschertschen River, or through one of the passes of the Altyai-Tag Mountains, the railroad would reach the high plateau of Tsaidam, whence it would reach in an easterly direction along the Semenow Mountains (or through a tunnel crossing the latter) to Lake Kuhu Nor. From here the railroad would run through the valley of the Hsi-ning-ho down into the valley of the Hoang-ho and to the large and important city of Lan-Itschan. This is the capital of the Province of Kan-Su, which has a population of 9,300,000. From this province the railroad would have to run eastwards through the valley of the Tan-ho to the city of Tsin and further east to the cities of Fongtsiang, Hsienjang and Nsingan on the upper course of the Wei-ho, in the province of Schensi. The Wei-ho reaches the Hoang-ho just at the place where the great river suddenly changes its course from the north to south, and empties itself in a northeasterly

direction into the Yellow Sea. From the upper course of the Wei-ho to its mouth into the Hoang-ho and then down the Hoang-ho Valley to the sea there is a succession of great cities; the province of Schensi on the Wei-ho alone has a population of 8,300,000. From this province the railroad would have to run through the valley of the Hang-kiang southward to Hankow—at present the center of Chinese internal trade. This line would connect the provinces of Honan and Hupli, of which the former has a population of 22,000,000 and the latter of 30,000,000. From Hankow, by means of steamship communication up stream the rich province of Setschuan could easily commercially be opened, a province, which has a population of about 45,000,000.

"The railroad Samarkand-Hankow, or better St. Petersburg-Nanking, thus would find in China alone a market of 100,000,000 people, and this, if we leave out of consideration the couple of millions of people of East Turkestan, the Russian foreign trade with the East would increase year by year by many million rubles, and this in a district where neither Great Britain nor any other power ever could interfere with our commercial intercourse."

A Cross-Gaining and Grooving Machine.

Illustrated herewith is a cross-gaining and grooving machine made by the Atlantic Works, Twenty-third and Arch streets, Philadelphia. It is designed for working car framing, bridge timbers and similar material and it is a good example of modern construction. The spindles are large and driving pulleys are between the bearings, all bearings being long and lined with anti-friction metal. The counter-shaft is placed overhead, idler pulleys keeping an even tension on the belt. The reciprocating motion is automatic, but can be stopped or started by hand, stops being provided for different lengths of stroke. This motion is obtained by a single belt from the counter-shaft, running constantly in one direction without shifting.



An Improved Cross-Gaining Machine.

The cutter head frame has an up-and-down adjustment by a lever shown in the illustration. The depth of gains is regulated by adjustable stops. The steel cutter heads can be expanded from 1½ in. to 3 in. and have spurs for cutting the shoulders, and knives for removing the wood between. The table, of any required length, is made of 6-in. I-beams strongly put together, with bolsters and clamps for holding the material. Anti-friction rollers move the material, the range of size being from 16 to 24 in. There is a system of stops for regulating the position of gains without laying them out. A power feed works in both directions and there is also a hand feed for short movements. A single or double-spindle boring attachment is fitted to the frame of the machine if desired, or a four or five-spindle machine can be set alongside, using the same table and stops that belong to the gaining machine. If preferred, a table made of wood, with bolsters, clamps, rollers and power feed, is furnished instead of the iron table. The counter-shaft has pulleys 16 in. in diameter with 7-in. face and should run 500 r. p. m. A machine with 20-ft. table weighs 8,500 lbs. The floor space required is 14 ft. by twice the length of the table, and the horse power 5.

Electrical Tramways in Barcelona.

The following has been received from Consul-General Lay, of Barcelona: "I give below the names of the chief contractors of a tramway line about to be built between Barcelona and Horta, a distance of four miles. The name of the branch line will be the Barcelona and San Andres Railway, work to be commenced in June. The chief contractor is F. H. Bagge, 14, Ronda Universidad, Barcelona, who imports his trucks, tubing for posts and motors from the United States. The wire is to be supplied by Hulheim, of Rhine, Germany; rails, from Belgium; car motors, by General Electric Company, Paris; gas engines, Crossley, of Manchester; cars from Saragossa, Spain; accumulators, Tudor; dynamos, Industrial Electrico, Barcelona.

"I find it very difficult to get any reliable information about projected roads, especially about those for which the equipment is being bought, as the directors, chief engineers, and other officials of new tramways are foreigners and have their headquarters in other cities. I would suggest, therefore, that our manufacturers write the Société Anonyme d'Entreprise Générale de Travaux, Liege, Belgium, in good time before the contracts are let at Brussels. The society is a very large one and has built many miles of tramways in Europe, and is constructing lines in Russia, I understand, at the present time. In connection with the sale of electrical supplies and equipment in Barcelona, I would advise manufacturers of motors not used in connection with tramways and other small electrical appliances that their agents here must keep a certain stock of such articles on hand, as I am informed by several electrical importers of Barcelona that frequently English or German goods are sold because the purchaser cannot wait for better American-made articles, which take so long to come from the United States."

The Taylor-White Tool Steel Treatment.

For more than two years experiments have been in progress with a new tool steel treatment and secondarily a special make of tool steel, at the Bethlehem Steel Company's works, South Bethlehem, Pa. After exhaustive investigation, the conclusions of which were most gratifying, an invitation was extended, July 31, to various visitors to witness the working of tools made by the Taylor-White process. The visitors were received by Messrs. H. F. J. Porter, F. H. Taylor and Maunsel White. From the latter two gentlemen, consulting engineer and engineer of tests, respectively, the process takes its name.

All that it is desirable to have known of the process now is that it is a heat-treatment process, rather than a special make of steel; but that the makers have found it advisable to use a special steel that is tractable in shaping for various uses. The rights that are sold are based on the machine capacity of the shops in which the steel is to be used. It is a furnace and auxiliary equipment, with the knowledge of how to use it, that are conveyed in the purchase rights; an intelligent laborer can treat the tools which are shaped before hardening.

The process penetrates to the core of tools as heavy as 4 in. square. All high grades of self-hardening tool steel are greatly benefited by the treatment. An annealing process has been established, also, by which the special brand of the Bethlehem steel is quickly and thoroughly annealed for dressing.

The following is a review of progress up to the first of the year.

Mr. F. W. Taylor, in the reorganization of shop methods, found several changes necessary, the most important of which was the discontinuance of the miscellaneous assortment of tool steels used by the different men in the shop and the establishment of a standard and uniform grade of tool steel, the use of which would be enforced upon all of the men, regardless of their preferences. A special lathe was set aside for the purpose of experimenting with tool steels of different makes, with a view to the selection of a standard for use, and several picked men were set to work testing the relative merits not only of the different tool steels then in the shop, but all brands of established reputation. In the elaboration of these tests the services of engineer of tests, Maunsel White, were enlisted. In the tests of these various makes of tool steels, over 200 tons of steel forgings have been cut up into turnings on the experimental lathe, and it is estimated that over $100,000 have been expended in labor and material alone in developing the process. This large investment, however, has more than been repaid in the last year by the saving in labor cost and larger output. The increase in cutting speed of the various machine tools throughout the machine shop has entirely reversed the inequality of balance existing two years ago, so that the capacity of the forge has had to be largely increased to keep pace with the rapidly growing efficiency of the machine shop. The introduction of this process for the treatment of tools has made it possible to speed up main lines of shaft from 90 to 250 revolutions, and further changes in counter-shafts have been made to speed up individual machines, which has brought about the largely increased efficiency in the machine shop.

In order that the rate of progress might be observed, records from time to time were made of the average amount of metal cut per hour per tool throughout the shop. The table shows the increase in efficiency made up to January of this year.

Average.	Oct. 25, '98.	May 11, '99.	Jan. 15, 1900.	Gain in % cut of third over second.	Gain in % cut of third over first.
	ft. in.	ft. in.	ft. in.		
Cutting speed	8 11	21 9	25 3	16%	183%
Depth of cut.....	.23	.278	.30	8%	30%
Feed	.07	.0657	.087	32%	24%
Pounds of metal removed per hour..	31.18	81.52	137.3	68%	340%

A very important feature resulting from the use of this process is that the tools are extremely uniform in quality, so that work on which they are used can be regularly performed at the maximum rate of speed. The variation in the quality of these tools does not run over 5 per cent., which insures a much greater degree of uniformity than is attained in any other tools known, whether made of tempered or any air-hardening steel. With uniform tools the piece work system can be most efficiently used, as the piece rate must always be based not on the average cutting speed of the tools but on the speed of the worst tool in use. A great advantage in the use of these tools is that when cutting dry at the rate of maximum efficiency, the chips should come off blue. These blue chips enable a foreman at a glance to tell whether the work is being done at the proper speed. When running under water at the proper cutting speed the chips should show blue immediately upon shutting off the water and allowing the tool to cut dry for a few moments. The apparatus used in the Taylor-White process offers also a simple and effective means of heating any other tools at uniform temperatures, which can be easily controlled, so that ordinary carbon steels can be hardened through the use of the same apparatus at temperatures which will insure greater uniformity and higher qualities in this class of steel as well as in self hardening steels. As is well known, tempering steels of different makes and different qualities requires different temperatures for hardening to obtain the best results, therefore by means of this apparatus, which is capable of closely controlling temperature, these points may be accurately determined for each class of steel and made use of in daily practice. The operation of the process is extremely simple, as it is controlled by apparatus which regulates the different steps and does not require skilled or expert labor.

Among interesting and remarkable exhibitions made on the day referred to, and at subsequent tests within our knowledge, were the following: A very hard steel forging unannealed, containing one per cent. each of carbon and manganese, was turned at a cutting speed of 15 ft. per minute, depth of cut 3-16 inch, feed 1-16 inch, for a period of 20 minutes. At the end of this time the Taylor-White tool was in good condition. The best known self-hardening tool obtainable was substituted and failed utterly in 15 seconds. An extremely hard cast iron roll (not chilled) was turned at the rate of 50 ft. per minute for a duration of 16 minutes, depth of cut 3 1-16 inch, feed 1-16 inch, and the Bethlehem tool remained in good condition. A tool made from a steel which has been acknowledged to be the highest known grade of self hardening steel was substituted and was ruined in 10 seconds. After the latter tool had failed incidentally coating the cast iron with an extremely hard glaze, the Bethlehem tool was restored to the post without grinding and cut through the glazed surface and continued to cut for several minutes without any indication of having been impaired.

Ordinary machinery steel was turned at the rate of 150 ft. per minute, depth of cut 3-16 inch, feed 1-16 inch, for four consecutive minutes with the edge of the Taylor-White tool remaining unimpaired, and enduring for 5½ minutes with very slight deterioration. A selected self-hardening tool, supposed to be of highest grade, was substituted and failed in 10 seconds. In this operation the shaft being turned was 15½ inches diameter, and 12 inches of length were turned under the above given conditions, the Bethlehem tool being red hot a good portion of the time. This steel is said to fail in tool operations at about 1100 deg. F., while the best known grades of self-hardening steel fail in the neighborhood of 600 degrees.

The big ingot lathe in the Bethlehem Steel Works handled 460,000 lbs. of steel per month before the Taylor-White steel was used. Since it has been used the monthly output of this lathe in supplying forging blocks for gun tubes, jackets and other hollow-forged work, has been increased to 2,000,000 lbs. The preparation of test pieces from U. S. Government and other work is a very essential part of the machine shop operation. Before the use of Taylor-White steel it required the constant work of six men and machines to prepare the necessary number of test pieces. This work is now done by one man on one machine and is but a single illustration of many that could be written showing that the advantage gained by the use of this tool steel is in many cases as six is to one.

The recital of unusual cutting speed and the remarkable endurance of these tools could be prolonged indefinitely. From the railroad point of view the advantages were tersely summed up by one of the most conservative and well-informed superintendents of motive power of our acquaintance, as follows: "Because of the greater proportion of comparatively light operations in a railroad shop the increase per machine must fall lower, in the average, there than in operations as heavy as those of the Bethlehem Steel Company. Nevertheless, I am satisfied that in a division-point railroad shop, where say 200 engines are taken care of, the machine output can at once be increased 25 per cent. by the use of this steel, and ultimately 50 per cent., or more, as machines are strengthened and men are adapted to the quicker work."

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The movement in the Massachusetts Legislature this year to secure a general reduction of passenger fares did not amount to much, but some of the newspapers are following up the demand for lower fares by asking for an interchangeable mileage ticket. Mileage tickets, good for bearer, are sold on some or all of the principal roads, at two cents a mile, but a traveling salesman has to have several books. In one prominent instance the condition incident to diverse ownership of short railroads, which was formerly characteristic of all parts of New England, still prevails, and it is on a line which in the summer is much traveled. A passenger going from Hartford, Conn., to the White Mountains, may use a mileage book of the New Haven road to Springfield, 26 miles, and then one of the Boston & Maine to South Vernon, 50 miles; but then for 10 miles to Brattleboro he must ride over the Central Vermont, while from Brattleboro to Windsor, 50 miles, the Boston & Maine comes in again. Beyond Windsor the Central Vermont is traversed for 14 miles to White River Junction, and then the Boston & Maine again takes hold. One can readily sympathize with the passenger holding this grievance, for with nine-tenths of all the roads in the country giving the passenger a long journey on one ticket, and a pretty small ticket at that, frequent inspections by conductors come to be looked upon as an annoyance, whether they be so, per se, or not. But just think of the annoyance the railroads have to undergo from the frequent changes of engines and crews and inspection of cars! The passenger may rest assured that the railroads will do away with this source of delay and expense as soon as they can see their way clear to do so; and when that is accomplished the conditions will be favorable to meeting the other part of the grievance, which, no doubt, is the main part—the high fares asked for single tickets.

Tests of Street Car Brakes in New York.

We received a week or two ago a copy of an elaborate report of competitive tests of street car brakes made by the New York Railroad Commission, and had prepared a short review pointing out certain inconsistencies in the results which tend to discredit the accuracy of the tests. We discover that some people take these tests more seriously than we had supposed they could be taken, and therefore it seems a duty to point out some of the defects of the tests and the records.

In fact the report contains enough information to show that either the graphical recording apparatus was at times badly out of order or errors were made in compiling the records, and as this was not discovered and pointed out by those in charge, probably no one is justified in putting much reliance in the tests.

Brakes of sixteen makers were tested, each brake being fitted to a car furnished for the tests by the Metropolitan Street Railway Company of New York, and the trials were made on its Lenox Avenue line. The recording apparatus was automatic and so arranged that the stop signal was sounded when the pointer of a Boyer speed recorder registered a certain initial speed; then also the recording apparatus was started, drawing a curve from the time the signal was given to the end of the stop. The co-ordinates of the final diagrams are distance expressed in feet and time in seconds. After one brake had been tested the recording apparatus was changed to another car fitted with some other brake, and the trials were repeated.

The calibration of the recording apparatus is described in the report, but we suspect that this was only done at the beginning of the tests, and was not checked after the recording apparatus had been changed from one car to another. This seems the more likely, as the records of the first series of tests are nearer correct than those of the second and of most of the succeeding series. Further, the several diagrams from each car are similar one to another, but generally each series differs from that which preceded and followed it.

In addition to tables giving the details of the stops, the report contains sixty-five diagrams showing graphically the relation between distance and speed during each stop, so that it is possible to note from the diagrams how far a car traveled in any given second. It was the intention to make stops from 8, 12, 15 and 16 miles an hour, but the diagrams show great variations of initial speed, based on the distance traveled in the first second. We have computed the speed during the first second of the several stops from the distances given by the diagrams.

There were 57 stops from nominal speeds of 8 miles an hour, in 97 per cent. of which number the initial speeds indicated by the diagrams is greater than 8 miles an hour. The maximum got in this way is 16 miles, and the average of the high tests is 12 miles an hour.

Of the 51, 12-mile diagrams, 63 per cent. show speeds during the first second greater than 12 miles an hour; the maximum initial speed is 24.5, and the average of the high tests is 17 miles an hour. Of those diagrams showing reported initial speeds at and below 12 miles an hour, the minimum is 5.5 miles, and the average 10 miles an hour.

There were 49, 15-mile tests, 57 per cent. showing higher speeds than intended. The maximum initial speed noted during the first second of these tests is 26 miles, and the minimum is 8 miles an hour; the average of the high tests is 19 miles, and of those tests supposed to have been started at and below 15 miles an hour, the average is 11.5 miles an hour.

In the same way of 72 tests, nominally from 16 miles an hour, 59 per cent. of the diagrams indicate initial speeds too high. The maximum initial speed shown is 51 miles an hour, and the lowest is 5 miles. The average initial speed of the high tests, 59 per cent., is 22.5 miles, and of the other group, presumably 16 miles and lower, the average speed is 12 miles an hour.

Assuming that these are not errors in compiling the results of the tests, it seems unnecessary to comment on apparatus which will at one time record 5 miles and another 51 miles an hour when the car is presumed to be running 16 miles an hour. Such apparatus is either worthless or is improperly handled.

Another queer thing is that in about a dozen tests stops were made in greater distances than the car would have run in the same time had the initial speed been maintained. Thus as an example, a stop was made from 15 miles an hour in 5.9 seconds, the distance being 133 ft. 6 in. Had the car maintained the reported initial speed of 15 miles an hour (22 ft. a second) for 5.9 seconds, it would have traveled only 129.8 ft. in the given time. In this particular case the stop was made on an ascending grade, and merely shows of what little value are the records of these tests.

An elaborate comparison is made of the performance of the different brakes. The weight of the car and load is multiplied by the square of the speed at the time the stop signal was given, and this is divided by the distance the car ran before stopping. Under the circumstances this comparison probably has little or no value. The weight of the car and load is stated in the report to be an assumption, and we have shown that the nominal initial speed is not within gunshot of the automatic records, while in several cases the speeds shown in the table are absurd; in fact nothing is definitely known about the speed. As there is no check on the distance record and other factors are in error, the distances may or may not be correct. So much for this rating which has been worked out with such time and labor, and probably the chief thing to be regretted is the effect which a job of this kind is apt to have on competitive tests. In the future brake makers could very well hesitate before submitting their apparatus to such trials.

Annual Reports.

Chicago & Northwestern.—The Chicago & Northwestern Railway Company presents its 41st annual report, being for the year ending May 31, 1900. The average miles worked during the year were 5,219, but the miles in actual operation at the date of the report, namely, May 31, were 5,303. The increase in average miles worked as compared with the year before was 142, but another year the report of the results of working will cover a materially longer mileage. Last December the Board of Directors adopted measures for the union of all of the lines of railroad and of the proprietary companies whose stocks are owned by the Chicago & Northwestern and whose lines form a part of the Northwestern system. At the annual meeting of the stockholders held last June the action of the directors was approved and half a dozen subsidiary companies became a part of the system. The mileage therefore of the Chicago & Northwestern including the lines now added, is 5,486.42, but to this should be added about 76 miles of proprietary lines, making a total of 5,562.5.

The results of working for the year are summarized in the table below:

	1900.	1899.	Increase. Per Ct.
Miles worked	5,219	5,077	2.8
Passenger earnings	$9,200,688	$8,067,627	11.6
Freight earnings	32,008,684	28,155,677	13.7
Miscellaneous earnings	1,939,433	1,793,011	8.2
Total	$42,950,805	$38,016,314	13.0
Operating expenses	25,774,410	23,658,042	9.0
Taxes	1,160,551	1,112,201	
Interest on bonds	6,069,387	6,232,235	
Appropriated for construction and equipment	4,542,041	.....	
Sundry charges	414,693	399,218	
Net receipts	$4,989,723	$6,614,619	
Income from investments	529,799	542,977	
Net income	$5,519,513	$7,158,596	
Dividends	3,914,394	3,523,270	11.1
Surplus	$1,605,119	$3,635,326	

Notwithstanding lower freight rates the ratio increase in gross earnings from freight is two per cent. greater than the ratio of increase in gross earnings from passenger business. The passenger miles increased 9.18 per cent. and were in the year 454,614,457. The average fare per passenger mile rose from 1.94 cents to 1.98 cents, the increase having been 2.06 per cent. The tons one mile, increased 19.2 per cent. and were 3,849,368,000, and the ton-mile rate was 0.83 cent as compared with 0.87 cent, a decrease of 4.6 per cent.; that is, if the ton-miles of 1900 had been performed at the rate of 1899, the gross earnings of the company would have been larger by $1,440,000.

Operating expenses increased in all items except maintenance of equipment. Maintenance of way and structures, which amounted to $5,592,000, increased 18.4 per cent. Conducting transportation increased 15 per cent., to $15,047,000. Maintenance of equipment, however, decreased 14 per cent. and was $4,350,000. There was a small decrease in the charge to repairs of passenger locomotives; also to repairs of passenger cars and ferry boats. There was a very large decrease, namely, $1,161,000 in repairs of freight cars. These were the four items in which maintenance of equipment decreased and probably the decrease was in purchase for replacements. As a matter of fact the company bought during the year 82 locomotives for replacement, charging their cost to operating expenses. These 82 locomotives are equivalent in tractive power to 203 locomotives of the classes which they replaced. The motive power was further increased by the purchase of 50 locomotives, 20 of which were charged to construction and equipment account, and 30 to new lines. Notwithstanding the decrease in the charge to repairs of freight cars, the total carrying capacity of the company's freight equipment gained in the year 14.37 per cent., being at the end of the year 1,012,880 tons. Obviously, the equipment is not neglected.

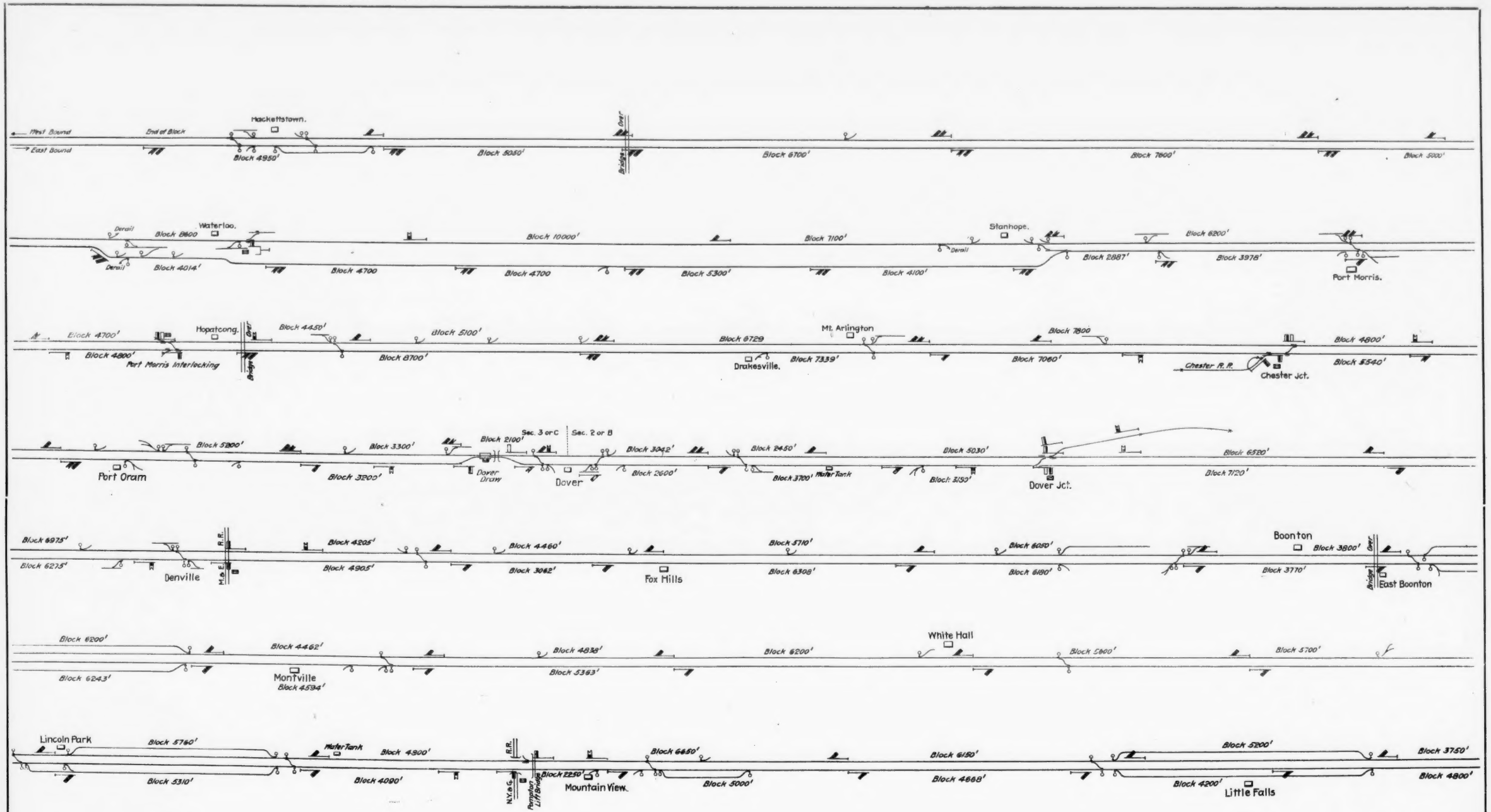
Thirty-seven thousand four hundred and five tons of new rails and 12,880 tons of usable rails were laid during the year, the cost of these having been $1,071,312, and the net cost, after deducting the value of old rails, $316,384. The new rails cost per ton $22.40, while in the preceding year the cost per ton was $18. The ties laid in the year now reported on numbered 2,037,284, an increase of about 690,000 over the preceding year. The cost per tie was 35 cents in 1900, and 34⅓ in 1899, or practically the same. This does not include the cost of labor.

Construction charges amounted to $15,312,000. Of this amount, however, nearly $8,000,000 is the cost of new railroads bought, and the charge on account of second main tracks is $2,026,159. This 15 millions includes also 7⅓ millions for equipment and 4½ millions of it is charged to income account.

The reader will not fail to notice that the sum of 4½ million dollars has been appropriated out of income to construction and equipment for another year. And yet the company paid 7 per cent. on its preferred stock, 6 per cent. on the common and had $1,605,000 net income over all charges. It was a fine year.

Chicago, Rock Island & Pacific.—The report of this road to March 31, 1900, was issued some weeks ago, but the few facts which we give below will not have lost in interest by delay.

As with other companies, the larger portion of the enhanced revenue was absorbed by expanding expenses, of which the least part was due to the extra cost of mov-



Automatic Block Signals Between Little Falls and Hackettstown—Delaware, Lackawanna & Western Railroad.

ing the larger traffic. Thus, of the gain of $1,982,690, or 9.6 per cent. in gross, $1,321,061 was absorbed by increased operating expenses. Of this amount, however, only $530,690 was due to the heavier cost of conducting transportation. Even with the expansion of the expense account the net income was sufficient to show about double the dividend now paid. The balance was $4,462,000, or 8.93 per cent., against 7.55 per cent. earned in 1899. The balance carried over was $2,462,475, but this allowed for the deduction of only 4 per cent. dividends, the other 1 per cent. which the company paid being charged against a special fund.

Two features of special interest are the better rates and the effect of the increased cost of materials required in operation, and, indeed, these are matters of especial interest in the annual statements now coming, and of which the Rock Island is the first to cover a period later than January, when these changes became most effective in their several ways.

The Rock Island in the year increased its passenger mile rate from 2.03 cents to 2.06 cents, and held its ton-mile rate of 1899, 9.9 mills. In 1899, however, it had increased this figure from 9.7 mills reported in 1898 and 9.6 mills in 1897. The stability in the average freight rate is all the more striking because the Rock Island has developed its through tonnage more rapidly than its local business. The changes in passenger traffic have reversed the tendency in freight traffic, for the largest share of the improvement in that department is due to the development of local travel.

A change in the form of Rock Island's commodity table makes it inconvenient to compare the changes in the character of the traffic. In the past year, however, the tons gained only 7.8 per cent., while the ton-miles increased 10 per cent., with an increase of $1,529,436, or 10.66 per cent., in freight revenue. The only material decrease in any class of tonnage was in wheat, presumably the result of the poor winter wheat yield in Kansas. This loss, however, was more than made up by the large movement of corn. The increase in iron moved was 100,000 tons, or nearly 30 per cent. Heavy increases are noted in merchandise, lumber, coal, etc., so that the stability of the average rate appears to be explained in part by the carriage of a larger proportion of general freight.

The effect of the higher cost of materials is not so apparent in the Rock Island's accounts as it will perhaps be in those of the companies whose fiscal years end on June 30. It is apparent, however, that the accounts were materially affected. The details of expenses show that in an increase of $1,321,060, maintenance of way expenses account for $623,858; maintenance of equipment for $315,880, and cost of transportation for $530,694; general expenses decreased $149,373.

In a coal-car demurrage case recently decided by the English Railway Commission Court, the Midland Railway was sustained in its demand on a coal merchant for 12 cents per truck per day for cars detained more than four days. From the report before us the precise basis on which the charge was calculated is not apparent, but we assume that it varies according to the tonnage. Assuming that a car holds 10 (gross) tons, the detention of a 60,000-lb. American car ought (on the same basis) to be charged for at about 33 cents a day, or a 40-ton car 44 cents, or a 50-ton car 55 cents. Possibly, however, we are not warranted in making a comparison of this kind between English and American charges. In England the cost of the ground at terminals is usually a more definite element in the freight charge than with us, so that it might not be quite equitable to make a demurrage charge large enough to cover the cost of both car and track-room. But even 25 cents a day, for the largest car, would make a very gratifying offset to some of the enormous expenses and wastes which seem to be inseparable from large terminals (and small ones), if only we could make sure of collecting it. In the matter of excessive free-time, the situation of our English friends seems to be just as bad as our own.

NEW PUBLICATIONS.

Train Dispatchers' Bulletin.—The July number of this periodical, which is No. 1 of Volume V, appears in a new form. It is now published at Toledo (422 Eastern avenue). The address of the editor, Mr. J. F. Mackie, remains the same as before, 7042 Stewart avenue, Chicago.

Official Proceedings of the Western Railway Club.—Published by the Club; Mr. J. W. Taylor, Secretary, 667 Rookery Building, Chicago. This is the bound volume of the Club Proceedings furnished to the members, containing the papers and discussions between September, 1899, and May, 1900. There is an index, and the Secretary has a limited number of these books for sale.

Arch Bridges; Tables of Engineering Data. Compiled by Prof. Malverd A. Howe, Rose Polytechnic Institute, Terre Haute, Ind.

Prof. Howe has compiled with great labor and diligence data of 322 masonry arches, 77 wrought iron and steel arches, 44 cast iron arches, and 63 concrete and metal concrete arches. His tables give dimensions, country and location, material, purpose, engineer, date, reference to description and other information. All of this is arranged in convenient tables and blue-printed. Prof. Howe says that he has no doubt there are many errors in the tables, as he had to get most of his data from published descriptions, some of which did not agree. The tables are copyrighted by him, and doubtless copies can be procured from him.

American Foundry Practice.—Treating of Loam, Dry Sand and Green Sand Moulding and Containing a Practical Treatise upon the Management of Cupolas and the Melting of Iron. By Thomas D. West. Illustrations and index. Tenth edition. 12mo, cloth. New York: John Wiley & Sons, 1900. Price $2.50.

The first edition of Mr. West's manual of foundry practice appeared in 1882. In 1887 it was carefully revised for a sixth edition, and the author says that the sales show to-day as great a demand as during the first few years of its issue. Of a book so long before the public and so well known, it is hardly necessary to write a review. The author treats first of the moulder and his trade, then of green sand moulding, of loam and dry sand moulding, of the manipulation of iron castings and concludes with a chapter of notes and receipts. All of the details of iron foundry practice are carefully and thoroughly considered, and the book cannot fail to be of use to a great number of people.

A Hundred Years of Bridge Building.—By George C. Mehrtens, Professor of Engineering, Koenigliche Technische Hochschule, Dresden. Translated from the German by Ludwig Mertens, C. E. 135 pages, 195 illustrations.

This work was prepared by Prof. Mehrtens for six leading German firms of bridge builders, and has been published in German, French and English to supplement their exhibits at the Paris Exposition. It is said that but 500 copies of the German edition will be sold, but during the Paris Exposition 1,000 of each of the three editions will be distributed on request of engineers interested in the subject. In the first chapter the first iron bridges and the materials used in iron bridges are reviewed, the second part is a history of girder systems and a discussion of the theory of bridges, the third part deals with improvements in the construction of iron bridges, and the fourth is given up to descriptions of the plants and the work of the six bridge companies for which this book was prepared. These are the Esslingen Works, the Gutehoffnungs Works, the Harkort Company at Duisburg, Philipp Holzman & Co., Ltd., the United Augsburg and Nuremberg Works, and the Union Works at Dortmund. There is also an appendix descriptive of the exhibition of German bridge works at Paris, and a list of references to bridge literature. The whole book is profusely illustrated.

TRADE CATALOGUES.

Fittings for Steam Vehicles.—The Ashton Valve Co., 271 Franklin street, Boston, Mass., issues a small pamphlet showing pop safety valves and relief valves, steam and air gages, water gages and gage cocks, all made by this company.

Mr. E. A. Ford, General Passenger Agent of the Pennsylvania Lines, has issued a handsome pamphlet descriptive of the Pennsylvania "Limited." In addition to being a fine piece of printing, it is unique in that the cover is done in the same colors that the "Limited" is painted; the style of the markings is also reproduced.

The C. W. Hunt Co., 45 Broadway, New York, has issued a little pamphlet designed as an introduction to the general line of machinery made by that company, which is described more in detail in the classified catalogues issued from time to time. This general pamphlet gives a very brief summary of the great variety of machinery put out by that company.

The Thornburgh Coupler.—Attachments Co., Ltd., Detroit, Mich., has issued a new catalogue, illustrating by half-tones and line engravings the Thornburgh draft rigging for single, double tandem and triple tandem springs, as applied to wooden and metal cars. Metal draft beams extending back to the bolsters are also shown. It is stated that there are now 25,000 sets of Thornburgh draft gear in use.

London & North Western Railway.—A handsome little pamphlet of 32 pages, telling all about this great English railroad has just been issued by the New York agent of the road. It is from the press of the American Bank Note Company. The work is designed especially for American readers, and has a great variety of information skilfully condensed into small space. The pages are liberally embellished with half-tone engravings, in color, showing some of the scenery reached over the London & North Western lines.

Railroad Legislation in Massachusetts.

The recent session of the Massachusetts Legislature passed much more railroad legislation than has been passed for many years. The most important bills were the ratification of the lease of the Boston & Albany to the New York Central, and that of the Fitchburg to the Boston & Maine.

The action in the Boston & Albany matter was reported in the *Railroad Gazette,* July 27, p. 518.

The lease of the Fitchburg to the Boston & Maine grew out of the agitation concerning the B. & A. lease. It was understood in the Legislature that the New York Central was prepared to lease the Fitchburg for 4 per cent. on the common stock. The State Directors of the Fitchburg in their annual report protested against the lease of the Albany, unless the rights of the Fitchburg were carefully guarded. When President Lucius Tuttle, of the Boston & Maine, found that the New York Central had given up the idea of a lease of the Fitchburg, he made an offer on the same 4 per cent. basis; but the State held $5,000,000 worth of the common stock of the Fitchburg, and the Governor and Executive Council recommended that the State Directors refuse to lease upon these terms. It was a rather audacious move on the part of Governor Crane, who is himself something of a railroad financier; and talk of a lease subsided. But President Tuttle soon renewed his efforts, having meanwhile been summoned to a private conference with the Governor, who intimated to him that the State would look upon the matter in a different light, if the B. & M. should purchase the State's holdings of Fitchburg common stock and guarantee a larger dividend on the preferred. So President Tuttle made a new proposition to pay 5 per cent. and to take the State's holdings, and also $500,000 in private holdings of common stock, and pay therefor in 3 per cent. bonds of the Boston & Maine. The Governor and Council accepted this proposition, and the Governor sent a special message to the General Court recommending the approval of the lease, the matter reaching the Legislature in this form. There were 13 hearings given by the railroad committee on this proposition, the main opposition to the ratification coming from representatives of the Central Vermont. The bill was favorably reported, and passed through both branches of the Legislature with comparatively little opposition, being signed by the Governor on June 29.

Incident to the Fitchburg ratification, however, there followed the introduction of a bill to provide for the purchase of the Central Massachusetts by the Boston & Maine, which leases it, the owners of the C. M., fearing that traffic would be diverted to the Fitchburg and thus prevent the payment of dividends, which are conditional upon earnings. As the easiest way out of the dilemma the Boston & Maine agreed to purchase the Central Massachusetts should its stockholders desire it.

After several years of debate a bill was enacted to provide for the transportation of bicycles of passengers as baggage on all Massachusetts railroads.

One of the perplexing grade crossing questions which came before the General Court was that relative to the abolition of 20 crossings in the city of Worcester. All of the railroads of the State now run into that city, converging at the Union Station. The fact that there was a question pending as to the lease of the Fitchburg, however, led to an agreement on the part of the city and the Railroad Committee to drop the attempt to separate grades on roads entering the city from the north (from Nashua, Gardner and Fitchburg, all using the Boston & Maine track), and a bill was reported and passed to provide for the separation of about half of the crossings, being all those located on the Boston & Albany, and the Norwich and Worcester Divisions of the N. Y., N. H. & H. The two latter roads were favorable to this action, and the bill passed all its readings, and was enacted without opposition.

The famous Fairhaven bridge grade crossing occasioned a number of hearings, as has been the case for the last six years. During that period this bridge matter has been before six different committees of the General Court. This year the form it assumed was as to the elimination of the grade crossings of the New York, New Haven & Hartford in the city of New Bedford, which would be occasioned, if this magnificent structure should cross the river at the normal street grade. The matter was considered by the Railroad and Harbor and Land Commissions jointly, and early in the year they reported in favor of carrying the bridge above the tracks, coming to grade at Water street in New Bedford, and the General Court passed a bill in accordance with this recommendation, the most important feature being the division of the expense, which is made much lighter upon the railroad than would be the case if there was an absolute grade separation, the fact being that after the bridge is carried over, there will still be a grade crossing for teams under it.

The question of abolishing grade crossings in Fall River was the last railroad matter considered, the Grade Crossing Commissioners making their decree July 16, and a bill being immediately reported and passed confirming the decree.

A bill was enacted to permit the Fitchburg road to take for a freight station all the land in Boston, bounded and enclosed by the Charlestown branch of the Fitchburg, the Hoosac Tunnel docks, the Harbor Commissioner's line and the new Charles River bridge, with the right to close all streets and avenues crossing said premises. This authority adds one more dock to the capacity of the Hoosac Tunnel docks.

A bill was enacted which will permit the city of Newton to proceed in the usual way to secure the elimination of the grade crossings on the southern side of the city on the line of the circuit branch of the Boston & Albany, and of the New York, New Haven & Hartford. The grade crossings on the northern side of the city, along the main line of the Albany road, have already been separated, and the policy of the railroad was to continue the elimination of crossings on the main line

before beginning the work on the branches. A theory obtained in Newton that the transfer of the railroad to the New York Central might interfere with the separation of these crossings, and, therefore, this bill was passed as a precautionary measure.

A bill was enacted to provide that the 10-cent rebate now paid on all cash fares collected on Massachusetts railroads may be collected by the passenger any time within one year. The rule has heretofore been that the rebate ticket was void after 10 days.

A bill was enacted making the salary of the chairman of the Railroad Commissioners $5,000 (an increase of $1,000), and his associates $4,000 each (an increase of $500).

A bill was passed providing for raising the viaduct in the town of Westfield, which has recently been built to separate the grade crossing at Elm street on the Boston & Albany. Westfield complained that this viaduct was built so low that it was impossible for a vehicle with a bulky load to pass under it, and also that the viaduct was unsightly. The main point in the bill which was passed is that the work of raising the viaduct is to be considered a part of the original grade crossing elimination, and will be assessed as such—65 per cent. upon the railroad, 25 per cent. upon the Commonwealth, and 10 per cent. on the town. The New York, New Haven & Hartford is also affected.

An important measure passed gives the Grade Crossing Commission, which is to decide upon the elimination of all grade crossings in East Boston, authority to change the location of the various railroads running through that section, but the present location of the Boston, Revere Beach & Lynn cannot be disturbed without its consent.

A law was passed requiring after January 1 next that every passenger train car regularly used in this State shall be provided with platform gates, under penalty.

A bill was passed whereby the number of workingmen's trains in the suburban district of Boston may be increased upon petition to the Railroad Commissioners.

A resolution was passed for an investigation by the Railroad Commissioners into the matter of requiring street railway companies to pay a proportion of the cost of the abolition of grade crossings in certain cases.

Among the measures which were killed was one to provide for 12-ride tickets at the rate of one cent a mile in the suburban district of Boston (this is about the rate on 100-ride tickets); for a general grade crossing separation in Lynn; to provide that in all grade crossings eliminations the railroad shall pay 80 per cent. and the Commonwealth 20 per cent., municipalities thus being exempted from any payment; for a uniform passenger rate of two cents per mile; to prohibit free transportation of State, city or town officials by railroad companies; to establish a Board of Railroad Administration of 15 persons, including the present Railroad Board and three State Directors, the board, to eventually take, if it so determines, any railroad in the Commonwealth and administer it as a State enterprise; providing that in case of accident on railroads to any part of the apparatus resulting in injury or death to an employee or passenger, said accident shall be deemed prima facie evidence of negligence; to limit all railroads to a five-cent single fare within the limits of Boston.

TECHNICAL.

Manufacturing and Business.

W. A. Reed, of Vermilye & Co., has been elected a director of the Safety Car Heating & Lighting Co.

Mr. Ira C. Hubbell, President of the Locomotive Appliance Co., which has had temporary headquarters at Kansas City, has opened offices at 1504 Fisher Building, Chicago.

The Pressed Steel Car Co., through its Southern agent, the Thornton N. Motley Co., has secured an order for 2,000 truck frames for the cars ordered last week by the Seaboard Air Line. Through the efforts of Mr. Motley the Pressed Steel Car Co.'s trucks have been adopted as standard by the Seaboard Air Line.

Frank Rearden, formerly Superintendent of the Locomotive and Car Department of the Missouri Pacific, has been appointed President of the Western Railway Equipment Co., Union Trust Building, St. Louis, Mo. This company is engaged in the manufacture and handling of railroad supplies, and makes a specialty of devices used on locomotives and cars.

The Chicago Pneumatic Tool Co. has engaged Fred F. Bennett as Sales Agent and Manager of Advertising, with headquarters at the main office of the company, Monadnock Block, Chicago. Mr. Bennett has resigned as Sales Agent for the American Steel Casting Co. and American Coupler Co. of Chester, Pa., the change taking effect July 1. Mr. Bennett served several years on Chicago daily papers as reporter and city editor, and later he was city editor of the Omaha *Republican*. Subsequent to this he was for some years Western representative of the *Railroad Gazette*. His long experience in the journalistic field, his railroad acquaintance, combined with his knowledge of trade publications, should make him a valuable acquisition to the staff of the company.

The company is building at Detroit a large plant for the production of its tools, which it is hoped to have in operation during September. The recent opening of the Olney plant of this company, it was thought at the time would relieve the pressure somewhat, but the increase in business seems to outstrip the enlargement contemplated at that time. Among the notable orders received during the month, after severe competitive tests, were the following: General Electric Co, Cramps Ship Yards, Philadelphia & Reading, Maryland Steel Co. and Riter & Conley Co. During the month the Richmond Locomotive Works adopted the Boyer drill as standard, placing an order for 34 No. 3 drills, in addition to the large number already in use by that company.

Iron and Steel.

The Youngstown, Ohio, mills of the Republic Iron & Steel Co. were closed August 4.

There are inquiries in the market according to local report, for 12,000 tons of light section rails for Argentina.

The Tampa Foundry & Machine Co. was incorporated in Florida last week, with a capital of $40,000, by S. L. Varendo, Peter O. Knight, John T. Moffitt, W. C. Thomas and J. W. Winn.

A lot of car material valued at $33,750 was sent last week by the "Italian Prince" to Buenos Ayres. The same steamer took about $25,000 worth of rails and a large quantity of finished material.

It is expected that the new rolling mill of the Buffalo Steel Co. at Tonawanda, N. Y., will be put in operation this week, making Bessemer steel bars, angles, channels, tees, etc. L. E. Block is president; P. D. Block, first vice-president; G. H. Jones, second vice-president; J. G. Joseph, treasurer; J. H. Porter, secretary.

The French Minister of the Colonies at Hanoi, Tonkin, is inviting bids until the last of August for the supply of the rails, ties, fish plates, bolts, crossings, etc., for 270 kilometers of single track railroad, one meter gage. Particulars may be obtained from the Direction de l'Office National du Commerce Experieur, No. 3 Rue Freydau, Paris.

Power Required to Operate Cranes.

Information is not always readily accessible in regard to the horse power used in the operation of cranes. These figures are convenient:

Jib Cranes.

10-ton, 10 h. p. motor, lifting 10 tons	13 h. p.	empty 1.2 h. p.
6-ton, 8 h. p. motor, lifting 6 tons	11.6 h. p.	empty 1.2 h. p.
10-ton, 10 h. p. motor, lifting 7 tons	11 h. p.	empty 1.2 h. p.

Traveling Cranes.

5-ton, lifting and carrying 4 tons	19.3 h. p.	empty 11.9 h. p.

A 5-ton, 3-motor, overhead traveler, built by Vaughan & Son, Ltd., West Gorton, Manchester, England.

Motion.	Speed, ft. per min.	Amperes.	Volts.	Horse power absorbed.
Hoisting, 5½ tons	5.5	28	100	3.87
Hoisting, light	11.5	8	100	1.07
Cross traversing, 5½ tons	85.	16	100	2.1
Cross traversing, light	110	6	100	0.8
Longitudinal traversing, 5½ tons	260	38	103	5.2
Longitudinal traversing, light	300	26	103	3.6

A. G. Parrot in *Cassier's*, November, 1899.

A 20-ton electric crane, 48 ft. 8½ in. c. to c. of tracks, hook speed, 10 ft. to 25 ft. per minute, trolley speed 60 ft. to 80 ft. per minute, bridge speed 200 ft. to 250 ft. per minute, running on a total of 8 wheels, 24 in. diam., required when working with a load of 20 tons:

Crane lifting	43 h. p.
Crane lowering (electric brake)	1.01 h. p
Crane lifting, traveling and traversing	48.83 h. p.

(W. W. C.)

A Fluid-Controlled Air Hoist.

The *American Machinist*, July 26, illustrates an improvement in air-hoists. The idea is to admit, above the piston of the hoist, a volume of oil that fills the cylinder cavity when the piston is in full downward position. Air admitted below the piston then does the work of lifting, with greater steadiness due to the return of oil to its receptacle, through a hand-regulated valve, and passage controlled by it. It is apparent that, having lifted the load to the height required for transfer on a shop trolley, the oil valve can be closed, the air pressure be intensified beyond what is necessary for the temporarily fixed height, and power thus be stored to lift the load to greater height when the final transfer is made after cutting of the air-main connection. There is evidently advantage in this arrangement.

Kingston Locomotive Works.

These works were offered for sale by auction July 10 and only received two bids; one of $30,000 from J. W. Pyke, of Montreal, and the other of $50,000 from Mr. McKelvey, of Kingston. The sale was withdrawn, as the reserved bid of $120,000 was not reached. (The works are said to have cost $250,000.) The works are now reported sold to a company in which Mackenzie & Mann, of Toronto, James Ross, Campbell Reeves and James Pyke, of Montreal, are heavy stockholders, and that it is their intention to build a number of engines there for use on the proposed extension of the Canada Northern from Fort William and Winnipeg on to the Pacific Coast.

The Tampico Wharf.

The Mexican Central Railway is building a new wharf at Tampico for the Mexican Government. Mr. A. J. Tullock, President of the Missouri Valley Bridge & Iron Works, has the contract for building the wharf, and we believe has had much to do with its designing. The work is to be thoroughly fireproof, and it is expected that it will be the best and most convenient plant of its kind on the American continent.

Automatic Block Signals on the Pennsylvania.

Philadelphia papers report that the Pennsylvania Railroad is to equip with electro-pneumatic automatic block signals the four-track main line westward from Philadelphia to Rosemont, 10 miles. This, we believe, is the first automatic signaling to be introduced between Philadelphia and Altoona.

The Nicaragua Canal.

On August 1 news came that the Government of Nicaragua had not only declared the concession of the Maritime Canal Company null, that having lapsed, but had taken possession of the property of that company. It is well-known no doubt that some time ago the Government of Nicaragua claimed that this concession had lapsed because of non-fulfillment of its conditions, and granted a new concession to the Cragin-Eyre Syndicate. An effort had been made at arbitration in this matter of the concession of the Maritime Canal Company, but the Nicaraguan Government imposed as a condition that the arbitrators should be citizens of Nicaragua. Later despatches say that the President of the Republic personally addressed the Nicaraguan Congress when it convened on August 1, and informed the Congress of the end of the concession to the Maritime Canal Company, and proclaimed the existence of the Cragin-Eyre concession.

Car Lighting

We recently published a table showing Pintsch gas equipment throughout the world, which gave the total number of cars then lighted by Pintsch gas as 98,182. Since the data in that table were collected 1,100 cars have been equipped with Pintsch gas in the United States. The figures up to August 1 make the number of cars so equipped in this country 15,458.

Brakes and Couplers.

The July issue of the *Bulletin* of the International Railroad Congress contains Mr. G. W. West's report to that Congress on the question of brakes and couplers. This deals with practice in the use of brakes and couplers on the railroads of the United States, and is a good round-up of the subject to date.

Hamlin Car Wheel Works.

The plant of the Hamlin Car Wheel & Manufacturing Co. at Catawissa, Pa., has been sold to J. K. Lockard, and a new company organized under the same name. Additional buildings are now being built, and new machinery will be installed to a sufficient extent to equip the works to make all kinds of narrow-gage cars, car wheels, castings, etc. The specialty will be export cars.

Illinois & Mississippi Canal.

Bids are wanted until noon of August 22 for building six miles of the Western section of Illinois and Mississippi Canal. Major J. H. Willard, Corps of Engineers, U. S. A., Chicago, Ill.

Gilbert's Gage Glass Preserver.

The gage glass preserver shown by the engraving is made of rubber, in sizes from ½ in. to 1¼ in., and is especially adapted for use on locomotive gage glasses. It is applied without the aid of a wrench, and the nature of the material of which it is made permits expansion and contraction of the glass. The claims made for the preserver are that it will perfectly pack gage glasses and prevent breakage in service; gage glasses in fittings which are out of line also can be made tight without danger of breaking the glass. They are made and sold by R. F. Morse, Providence, R. I.

A Fast Train in Prussia.

Recently trials have been made near Berlin of a fast train with a new style of locomotive, designed especially to get the highest speed permitted by the rules. The train hauled consisted of five vehicles each with four axles. The schedule time for the distance of 85.6 kilometers (53 miles), with grades of ½ of 1 per cent. in either direction, was 50 minutes to Berlin and 51 minutes from. In a trial the runs were made in 49½ minutes and 50½ minutes, respectively. The highest speed reached down a grade of ½ of 1 per cent. was at the rate of 124 kilometers an hour (77 miles), ascending the same grade 100 kilometers (62 miles). It was observed in the course of the experiments that enginemen and mechanical officers who had had much locomotive experience could not judge of the speed when it passed 75 kilometers an hour (46½ miles).

THE SCRAP HEAP.

Notes.

The Texas Railroad Commission has postponed the 25 per cent. reduction in freight rates which was ordered a few weeks ago.

It is announced that the California Limited Express of the Atchison road will, after Nov. 1, run through to San Francisco every day in the week.

Although the strike on the street railroads of St. Louis was formally settled several weeks ago, lawlessness continues in the city and cars carrying passengers have been damaged by dynamite on three different days within the past two weeks. On the night of August 1 three employees of the Street Railroad Company were assaulted.

A street car was blown up by dynamite in Dallas, Tex., on August 2.

Mr. Frederick U. Adams' air splitting train was run from Philadelphia to Baltimore on August 7, 97 miles, in 1 hour 41 minutes, which is said to be 12 minutes quicker than any train has ever before been run over that line. A regular train was overtaken before Baltimore was reached, and this necessitated slackening the speed. From Aberdeen to Waverly, 29.3 miles, the time was 24 minutes, equal to 73.25 miles an hour.

The Illinois Central has made an advance of 10 per cent. in the salaries of trainmasters and train despatchers on the main lines. The Pennsylvania has increased the pay of certain telegraph operators. The Denver & Rio Grande has increased the pay of track repairmen. Advances in pay have recently been reported on the Southern Railway (locomotive enginemen), the Lehigh Valley (freight trainmen) on the New York Central (track foremen) and the Erie and Wyoming Valley.

On the night of August 4 a passenger train of the Union Pacific was robbed by two masked men who boarded the train at Limon, Col., and one passenger, a man of 60 years, who refused the demands of the robbers and shot at them with a pistol, was instantly killed by the robbers, both of them firing at him. After the shooting the robbers proceeded to gather the valuables of the other passengers, compelling the conductor to aid them.

Traffic Notes.

The number of carloads of peaches shipped northward from Georgia this year is estimated to have been about 2,000.

Western papers continue to report a moderate amount of freight rate cutting and the irregularities now appear among the roads west of Chicago as well as on those east of that city.

The alleged favoritism shown by the freight department of the Chicago, Milwaukee & St. Paul for many years to the Armour Elevator Company is now reported to have been abandoned.

By the steamer "Massachusetts," which the New Haven road is now running between Providence and New York to compete with the Joy Line, the fare has been reduced to 75 cents each way. For one-way tickets this is 25 cents under the last rate announced by the Joy Line.

The Railroad Commissioners of Minnesota have issued a new freight tariff, applying to all the roads in the state; and the companies are allowed until September 1 to file objections. A large number of changes in the Commissioners' classification are also announced. The new rates are based strictly on distance, except that distributing and manufacturing points are allowed a slight advantage. In the thinly settled portions of the northern part of the state the new rates are made higher than in the rest of the state.

To meet the competition of the "Imperial Limited," which runs from Montreal to Vancouver over the Canadian Pacific in 100 hours, the Grank Trunk announces an arrangement of trains by which it is said that passengers will be carried through to the Pacific Coast in 93 hours. The route is over the Chicago & Northwestern, Union Pacific, Oregon Short Line and Oregon Railroad & Navigation Company's Railroad. The distance from Montreal to the coast is 3,191 miles, 285 miles more than over the Canadian Pacific.

Electrostatic Discharges on a High-Tension Line.

A recent issue of the *Electrical World and Engineer* contains an article giving observations on the working of a high-tension electrical power transmission line. These observations were taken under unusual conditions, along the line of the Telluride Power Transmission Co., whose generating station is near Provo, south of Great Salt Lake, and whose lines are operated at a pressure of 46,000 volts. The power is transmitted over two lines, 35 miles and 56 miles long. The first line is of No. 5 copper; the second, 56 miles long, is of aluminum, the equivalent of No. 4 copper. A third line of aluminum wire, equivalent to No. 5 copper, connects these two lines, forming an equalizer and a route for current to either camp in case either of the two camp lines direct should become disabled. Energy is therefore transmitted at times a distance of 70 miles. The total power transmitted is about 1,500 k. w., 2,010 h. p. The unusual conditions which attend this work are brought about by the great beds of salt on the shores of the Great Salt Lake, from which salt is, at times, carried into the air as a fine dust, and, with moisture, makes a sticky coating, which adheres to the transmission line within the dust area. Accompanied by clouds of moisture this coating results in short circuiting the line, sometimes to the extent of stopping the motors and flashing the lamps. The normal loss on the line is about 4 per cent. Thus far there has been no damage to the line by short circuiting other than burning out of one or two fuses at the main station. In describing the phenomena manifested in time of salt storms, it is said the discharge starts with sparking at the insulators, often occurring on a dozen or more poles simultaneously. The sparks are described as crisp and blue, accompanied by a crackling discharge like that of a Leyden jar. Following each other with increasing rapidity, the sparks at other points become the nucleus for other series, and almost continuous sheets of sparks are formed. Presently the sparking feature is lost, and the short circuit is manifested in the form of an arc of large volume. An illustration accompanies the article quoted, in which an arc flame, the width of a cross-arm and 8 ft. high, is shown as the final development of this short circuiting action. The flash has been known to endure from five to six seconds. The entire line ceases to spark for from 30 seconds to one minute after such a discharge as this is visible. Then the operation is repeated. It is said that on one occasion, between 8:30 p. m. and midnight, there were counted about 80 discharges on two miles of line, the action apparently being in pace with the movement of clouds which were drifting. It is stated that the Power Co. has experimentally transmitted over some of the Telluride lines a pressure of 125,000 volts, and that the installation of a line which will operate at 60,000 volts is now being considered.

Drought in the Southwest.

Press reports from Arizona say that the scarcity of water is unparalleled. Cattle, in the more arid portions, are said to be dying from thirst in great numbers. The condition is made more serious by the drying up of the Salt and Gila rivers and exhaustion of water in the Casa Grande reservoir.

Proposed Subways in Chicago.

President J. M. Roach, of the Chicago Union Traction Co., has submited to the Street Railroad Commission of Chicago a plan for down-town subway terminals for all the traction companies at an estimated cost of $24,000,000. The plan provides for 12 miles of subways. Six loops are provided for, and a tunnel under the river at Dearborn street.

New Railroads in the Caucasus.

The Russian Minister of Ways and Communications, Prince Hilkoff, has just authorized the building of three new railroads in the Caucasus. The first of these lines, which is to connect the port of Novorossusk with the Transcaucasus, is to have its starting point somewhere between the stations of Dinskaja and Stanitchnaja, of the Vladikavkaz R. R. The gage will be 1.524 meters (5 ft.), the same as the Vladikavkaz R. R., and the total length will amount to 455 km. (283 miles) with a possible branch line 134 km. (83 miles) long, from Sankhoume to Novo-Senaki. The term of the concession is 85 years, and the right of the Government to buy the line after 25 years, has been reserved. The cost of building is estimated at $11,500,000, and $1,300,000 will be expended for the erection of winter stations. The second line will start from Avtchaly, near Tiflis, and will have its terminal at Sahobo. This line will have for its special object to develop the vine districts of Tsinondal and Kakhetic. Its length will be 180 km. (112 miles). The cost is estimated at $12,000,000, of which amount 5,000,000 rubles will be issued in shares and 18,000,000 rubles in bonds. The term of this concession is 60 years, with the right of the Government to buy the line after 20 years. The concessionnaires do not solicit any state guarantee, but ask for an annual advance of 650,000 rubles during the first 10 years of exploitation, and for reduced rates for the transportation of the material for building the line over the whole system of the Transcaucasian railroads.

The third line, whose length will be 59 km. (36.7 miles), will connect the extensive mining districts of Sadonsk and Alaghir with the Transcaucasian Railroad. The cost of building this line is estimated at 5,296,000 rubles, and the line will be built by the Alaghir Mining Co. of Alaghir, Caucasus.

For further particulars applications may be addressed either to the Alaghir Mining Co. (as to the third line), or to the head office of the Vladikavkaz Railroad (Société de Chemin de Fer Wladicaucase), Grande Italianskaja, St. Petersburg. The chief officers of this company are: S. Kerbedz, President; W. Petchkovsky, Director, and N. Zwolinsky, Secretary.

Railroad Concessions in Spain.

The Spanish Government has recently granted a number of railroad concessions, for standard, narrow-gage and electric roads. Amongst them are: A concession granted to the "Sociedad Minera de Villaodrid," of Villaodrid, for a narrow-gage railroad line, from Puente Nuevo to the mining districts of Puerto Estrecho, in the north of Ribadeo. A large iron shed for storing ore is to be built in connection with this line. The "Sociedad Ferrocarril y Minas de Berga" of Berga, has a concession for a railroad between Olvan and Guardiola, to connect with the Manresa to Berga line. The latter, a narrow-gage railroad, is 51 miles long, meter gage, 11 engines, 19 passenger and 96 freight cars. The headquarters are in Barcelona. Mr. L. Pons is the President, and Mr. J. Volart, with office in Manresa, is Engineer-in-Chief of the line. A concession has been granted for an extensive net of electric railroads between Almeria, Benahadux, Rioja and Tabernas. At the head of this enterprise is Don José Molero Levenfeld, of Almeria. The Compañia Vasco-Asturiana has a concession for the extension of its present system to Ujo and Trubia. A syndicate of Ovense financiers has a concession for narrow-gage railroads from Orense to the Portuguese frontier, passing over Barbadanes, Celanova, Allaviz, Sandianes, Ginzo de Limia, Trasmovas, Coaledvo, Illaviz, Villara and Verin. Considerable quantities of rolling stock and material will be ordered abroad.

The Hog in the Bog.

A wrecking crew on the Delaware, Lackawanna & Western is digging a big engine out of the mud at Cresco. The engine, a "hog," ran away down a steep grade with forty-two loaded ice cars at its back July 12, and punged over an embankment into a bog. Its weight and the force of the plunge sent it deep into the bog, and in a couple of days it sank out of sight. The wrecking crews have been at work for several days, and the mud has been cleared away from around the engine so that in a day or two it can be dragged out. Two companion "hogs" will be used to do the pulling.—Press despatch from Wilkesbarre July 30.

A New Class of Locomotive for Natal.

In view of anticipated increase in trade in South Africa, a new class of locomotive has been built for the Natal Government Railways. The engine was designed by Mr. G. W. Reid, Locomotive Superintendent, and was built by Messrs. Dübs & Co., of Glasgow, under the supervision of Mr. M. W. Car, Consulting Engineer of the Colony. Some weeks ago the engine was erected at Durban, and the experimental trips made are said to have been very satisfactory. The requirements, as stated to Mr. Reid by the management, were to produce an engine adaptable to track having a ruling gradient of 1 in 30, curves of 300 ft. radius, and other limiting conditions; able to haul 120 tons over the steepest grade. This is a load 50 per cent. greater than that hauled by the "Dübs" engine introduced in 1899. These requirements have been met, and the Natal Government Railways now possess the most powerful locomotive that has yet been designed for South Africa, or for a similar gage in any other part of the world. The new "Reid" engine has five pairs of coupled wheels, as against four pairs in the old type. The cylinders are 19 in. x 27 in., as against 17 in. x 21 in. Increased boiler-power and coal-carrying capacity of 3¾ tons have been provided, and the tanks carry 1,800 gallons of water. The total weight of engine in working order is about 69 tons.

Exhibit of Mail Transportation at the Pan-American Exposition.

The Board of Management of the U. S. Government exhibit at the Pan-American Exposition, to be held at Buffalo, 1901, has intrusted to Mr. H. T. Newcomb, Chief of the Division of Agriculture in the office of the Twelfth Census, the work of collecting an exhibit showing the present growth and development of the transportation agencies employed in connection with the postal service. Among other things, Mr. Newcomb will undertake to collect views of the most attractive scenery along the routes followed by American mail service. He will be glad to hear from the officers of railroads or other transportation lines who wish to have their companies represented in this exhibit. No expense will attach to such representation, and the Government board will afford all possible facilities to those who voluntarily co-operate with it.

Baird's Signal Glasses.

Mr. John C. Baird, of Boston, maker of signal glasses and the originator of the yellow glass used on the New York, New Haven & Hartford, has received a letter from Mr. W. E. Chamberlain, General Manager of that road, dated Aug. 1, 1900, from which we extract the following:

"The new method of signaling on our road has passed the experimental stage. For railroad signal lamps the nels red for danger, nels green for safety and nels yellow for caution are, in my judgment, the most perfect colors in existence at the present time. All the lenses of a given color are alike, which cannot be said of any other glass that I have been able to procure. Of ordinary signal glasses I have been unable to pick out from a hundred lights more than 10 or 12, either of red or green, that were satisfactory and uniform. We discontinued white for safety and adopted the green, for a very definite reason. New white lights were being frequently introduced at different places along our lines, that came in line with our white safety signal lights, and puzzled the engineers. . . . . The ordinary red glass was complained of by the engineers because they could not calculate distances. Some glasses would be a dark red, some light, and with some, at a long distance, it was almost impossible to say whether they were red or not. It was the same way with the green, though the lights were all the same size. With the "nels" red, green and yellow, the men can calculate the distance, because the color is uniform. In the same atmosphere the signals show alike. The signals can be seen from one to three miles distinctly, and our engineers have frequently spoken of the benefit of the change."

Railroads in Nicaragua.

Despatches which announce the opening of the session of the Nicaraguan Congress say that the President in an address to Congress emphasized the Government's programme for extending the National Railroad.

The Shantung Railroad.

Latest information from Berlin is to the effect that no material or rolling stock whatever ordered for the Shantung Railroad has been counter-ordered on account of the Chinese troubles, but that the company has done its utmost to hurry the work of the prolongation of the first line from the German port of Tsingtan into the Province of Shantung. Neither has there been any delay in the transportation or shipping of the ordered and finished material. The administration of the Shantung Railroad Co., which has just given out the above statement, adds that it has even urged several works to rush the bridge work.

The Yazoo Canal.

The Atlantic, Gulf & Pacific Co., the contractors for the Yazoo Canal, has just won its fight for more latitude on its contract than was given its predecessor, which was forced to give up the contract some time ago. The victory consists of a concession in the matter of time limit and payments to be made, and will be based upon the output per month. Major Casey, Corps of Engineers, U. S. A., says the new arrangement, which means the striking out of the provision calling for payment only on a basis of 260,000 cubic yards removed per month, will prolong the work indefinitely.

LOCOMOTIVE BUILDING.

The Detroit & Mackinac is in the market for one six-wheel switching engine.

The State Railroads of Chile have ordered six engines from the Rogers Locomotive Co.

The Vera Cruz & Pacific is having two engines built by the Baldwin Locomotive Works.

The Union Pacific is reported to have ordered 27 locomotives from the Baldwin Locomotive Works.

The Cleveland, Cincinnati, Chicago & St. Louis has ordered six 10-wheel passenger engines from the Baldwin Locomotive Works; two of which will be Vauclain compounds.

The Cincinnati, New Orleans & Texas Pacific is having five consolidation engines built at the works of the International Power Co. They will weigh 120,000 lbs. with 106,000 lbs. on the driving wheels, and have 20 in. x 24 in. cylinders; 52-in. driving wheels; straight boilers with 240 tubes 2 in. in diameter and 13 ft. 6 in. long and a steam pressure of 180 lbs.; fire-boxes 107 11-16 in. long and 33⅜ in. wide and a tender capacity for 4,000 gallons of water and five tons of coal. The specifications call for Westinghouse brakes, Sterlingworth brake-beams, Diamond S brake-shoes, Janney couplers, Schroeder headlights, Nathan injectors and lubricators, U. S. metallic piston and valve rod packing, Coale safety valves, Leach sanding devices, French springs, Crosby steam gages and Latrobe truck wheel tires.

The Nashville, Chattanooga & St. Louis order with the Baldwin Locomotive Works for 10 consolidation freight locomotives, referred to last week, calls for September delivery. The engines will weigh 149,000 lbs., with 134,000 lbs. on the driving wheels, and will have 20 in. x 26 in. cylinders; 55-in. driving wheels; straight boilers with a steam pressure of 180 lbs.; 225 tubes 2¼ in. in diameter and 14 ft. ½ in. long; fire-boxes, 9 ft. long and 3 ft. 6 in. wide; and a tender capacity for 4,000 gallons of water. The special equipment will include Westinghouse brakes, Coffin process steel axles, Sterlingworth brake-beams, Janney couplers, Buck headlights, Nathan injectors and lubricators, U. S. Metallic piston and valve rod packings, Coale safety valves, Leach sanding devices, French springs, Crosby steam gages, standard tires, magnesia boiler lagging and the J. W. Thomas, Jr., pneumatic cylinder cock apparatus.

CAR BUILDING.

The New York Central & Hudson River is in the market for 25 suburban cars.

The Grand Trunk has ordered 300 coal cars of 80,000 lbs. capacity from the Pullman Co.

Swift & Co., Chicago, will, in a few days, place an order for from 200 to 500 refrigerator cars.

The Colorado & Cripple Creek has ordered 12 passenger cars from the Barney & Smith Car Co.

The Mississippi River & Bonne Terre has ordered 100 dump cars from the American Car & Foundry Co.

The Atchison, Topeka & Santa Fe is having eight cars

for passenger service built by the Barney & Smith Car Co.

The Tennessee Central is reported in the market for 200 coal and 100 flat cars. We have no official information.

The Lake Shore & Michigan Southern has placed an order with the American Car & Foundry Co. for 100 coal cars.

The St. Louis & San Francisco has ordered from the Rodger Ballast Car Co. 48 ballast cars, with high sides, and two plow cars. The ballast cars will be built with false floors, permitting their use as coal cars of 80,000 lbs. capacity.

The Chicago, Burlington & Quincy has ordered 500 wooden coal cars of 80,000 lbs. capacity from the Illinois Car & Equipment Co. They will be 30 ft. long and 9 ft. 4 in. wide, with sides 43 in. high. The specifications call for Bettendorf bolsters, arch bar trucks, Westinghouse brakes and McCord journal boxes.

The Seaboard Air Line order for 2,000 cars with the South Baltimore Car Works, referred to last week, calls for 1,000 flat, 700 box and 300 ventilated fruit cars. The specifications include Pressed Steel Car Co.'s trucks and truck bolsters, American Steel Casting Co.'s body bolsters, Standard couplers, Chicago Railway Equipment Co.'s side bearings, Westinghouse brakes, Sterlingworth brake-beams and McCord journal boxes. The box cars will have Chicago roofs and security doors.

The Baltimore & Ohio has ordered two dining cars from the Barney & Smith Car Co., and is asking bids on some cafe cars. The 100 box cars ordered from the South Baltimore Car Works and referred to July 27, will be of 60,000 lbs. capacity, weigh 32,000 lbs., and measure 36 ft. long, 8 ft. 4 in. wide and 8 ft. high, inside. The specifications call for bolsters of an open pattern, National hollow brake-beams, Westinghouse brakes, Buckeye couplers, Dunham door fastenings, Miner draft rigging, Murphy outside roofs, Pickering springs and Standard Car Truck Co.'s trucks. The brasses and doors will be from designs of the railroad; the journal boxes will be cast iron with steel lids.

BRIDGE BUILDING.

ANOKA, MINN.—Bids are wanted, according to report, August 25, for five steel county bridges. Address W. R. Gillis.

ARLINGTON, WASH.—The County Commissioners have under consideration building a suspension bridge over the South Fork at Jorden. It is stated estimates are being made.

BALTIMORE, MD.—The County Commissioners have been asked to build a bridge over Black River on Eastern avenue. The United Railways Co. is about to build a bridge near that place.

BUCKINGHAM, VA.—Bids are wanted August 23 for a steel highway bridge 96 ft. long over Slate River. Wm. Piele, County Engineer. Judge John R. Moss will open the bids.

COLVILLE, WASH.—The Spokane Falls & Northern will build some steel bridges to replace wooden structures.

CLEVELAND, OHIO.—The Wheeling & Lake Erie R. R., according to report, will build one 100-ft. through plate girder bridge, one 125-ft. through Pratt truss, three 154-ft. Pratt truss, and two 45-ft. deck plate girder bridges this fall.

COLUMBIA, PA.—The Commissioners of Lancaster and Dauphin counties are reported to have decided to build a bridge over Conewago Creek.

EASTON, PA.—The Lehigh Bridge Co. is reported to have let a contract to the Boston Bridge Co. for the substructure of its proposed bridge over the Lehigh River. The bridge is to be of two spans, and will be 668 ft. long. John McNeal, Jr., is Engineer for the company.

EWING, N. J.—The Board of Freeholders propose to build a new bridge over Shabbakong Creek, near Ewingsville school.

KANSAS CITY, KAN.—The Metropolitan Street Ry. Co., according to report, will build a bridge at Minnesota avenue.

KANSAS CITY, MO.—Plans have been made for a new approach to the Bell street viaduct. The matter will soon come before the Board of Public Works.

LANSINGBURG, N. Y.—The bridge proposed by the Stillwater & Mechanicsville Street Ry. over the Hudson River will be 550 ft. long. There will be two spans of 150 ft., one of 250 ft., and two of 50 ft. J. A. Powers, President, Lansingburg.

MCKEESPORT, PA.—The Pittsburgh & Lake Erie R. R. is preparing to build a four-span steel bridge to cross the Back Channel to Neville Island, about 10 miles below Pittsburgh. The company recently built a temporary bridge of old material.

MIAMISBURG, OHIO.—A resolution was recently passed by the Board of Trade ordering a hoist bridge built over the canal at Central avenue.

NEW BEDFORD, MASS.—Bids will soon be wanted for the temporary bridge over the Acushnet River between New Bedford and Fish Island. W. F. Williams, City Engineer.

NEW HAVEN, CONN.—The contract will probably be let soon for the new drawbridge at Kimberley avenue over West River.

NEW WHATCOM, WASH.—The Bellingham Bay & British Columbia Railway will build 25 bridges on the new road, for which separate contracts will be let.

OTTAWA, ONT.—Secretary J. R. Roy, of the Canadian Public Works Department, is advertising for tenders to rebuild the iron work of the bridge over the slide channels of the river at Ottawa, which were destroyed in the recent large fire. Plans at the Department of Public Works at Ottawa. Limit of date for receiving tenders August 16. Estimated cost, $19,500.

PATERSON, N. J.—Reports state that the grade crossing at Clifton avenue will be abolished.

PITTSBURGH, PA.—The Pittsburgh, Cincinnati, Chicago & St. Louis Railway has an ordinance before the Pittsburgh Council for a re-location of its tracks through Pittsburgh, which will require a number of masonry arches over Sawmill Run.

ROME, N. Y.—The State Superintendent of Public Works has declined to approve the plans to strengthen the bridge over the Erie Canal on South James street for the Rome City Street Ry. Co. A new bridge will be built.

SAN JOSE, CAL.—Bids are wanted by the Board of Supervisors of Santa Clara County until August 20 for a combination bridge of 100-ft. span on Hamlin street, over the new channel of the Guadalupe River. Henry A. Pfister, Clerk.

SNOHOMISH, WASH.—Bids are wanted until 1 p. m. August 30 for a trestle from Eby Island bridge to the Maryville & Snohomish road. T. E. Headlee, Clerk, Board County Commissioners.

STOCKTON, CAL.—Bids are wanted August 25 at the County Clerk's office for a steel highway bridge 293 ft. long over the San Joaquin River. The bridge will consist of one 230-ft. steel draw and one 60-ft. approach span. F. E. Quail, County Engineer and Surveyor.

TACOMA, WASH.—City Engineer Taylor is reported making plans for a new bridge at Proctor avenue on the Point Defiance line.

TAMPA, FLA.—The Council has decided that the Fortune street bridge is unsafe, and has ordered it closed.

TAYLORSVILLE, ILL.—Bridges have been ordered by the Board of Supervisors of Christian County in Bear Creek Township over Bear Creek, also over Lick Creek; three bridges over Locust Creek in Locust Township.

TECUMSEH, NEB.—A bridge is reported proposed by the Burlington & Missouri River Railroad over Nemaha River at a cost of $20,000.

TOLEDO, OHIO.—The Maumee Railway Bridge Co., Messrs. Harry E. King and Charles H. Tracy, of Toledo, incorporators, has petitioned the War Department for authority to build two bridges over the Maumee River. One bridge will have an approach along the line of Bay street in Ironville. The second is proposed above Toledo north of Perrysburg. A public hearing will soon be given.

WASHINGTON, D. C.,—The Melan type bridge proposed over Rock Creek at Quarry Road, for which $22,000 is appropriated, will be 80 ft. long and 36 ft. wide instead of 100 ft. as first proposed. Bids will be wanted as soon as the plans are finished. Address the District Commissioners. Plans are also being made by the Melan Arch Construction Co. of New York for a bridge over Piney Branch.

WOODSIDE, CAL.—Bids are wanted until 10 a. m. August 20 for a bridge over Bear Gulch Creek, San Mateo County. M. H. Thompson, Clerk, Redwood City.

WORCESTER, MASS.—Reports state that the Selectmen of Auburn and the Worcester & Webster Railway Co. have agreed as to location of the tracks over Dunn's crossing, where a bridge will be built.

Other Structures.

ASTORIA, ORE.—The Northwest Construction Co. (Astoria & Columbia River R. R.) has received bids for building the wharf and warehouse covering 100,000 sq. ft., and about 800 ft. of trestle approach near the Columbia River.

BOSTON, MASS.—The Boston & Maine R. R. will build a new station at Wyoming at a cost of $22,000. Work is to be begun at once.

BRAINERD, MINN.—Reports state that a number of changes are decided upon for the old St. Paul & Duluth line of the Northern Pacific. One is that the shops at Gladstone will be transferred to Brainerd.

DURAND, MICH.—The plans for the joint passenger station and office building for the Ann Arbor and the Grand Trunk at Durand, are with the officers of the G. T.

DURHAM, N. C.—The three railroads entering this city, the Southern, Seaboard Air Line and the Norfolk & Western are reported to have agreed upon a plan for a union station at a cost of from $50,000 to $60,000.

EAST ST. LOUIS, MO.—The plans for the new East St. Louis Relay Passenger Station will be submitted to the committee on August 10. It will be a brick building with a general waiting room of 2,000 sq. ft., smoking room with 500 sq. ft., with lavatory attached; ladies' waiting room of 300 sq. ft., with lavatory next; ticket office of 600 sq. ft., telegraph office of 250 sq. ft., lunch room of 750 sq. ft., kitchen of 225 sq. ft., barber shop of 200 sq. ft., news stand of 200 sq. ft., baggage room of 1,500 sq. ft., and two express rooms of 1,600 sq. ft. each. The building will be heated with steam, and the station will cost $20,000.

MOLINE, ILL.—The Davenport, Rock Island & Northwestern has plans for a passenger station to be built at once between Second and Third avenues west of Twenty-first street. A roundhouse and repair shops will be built in the suburbs.

NEW YORK, N. Y.—The Brooklyn Ferry Co. will establish a new service on the East River between Williamsburg, Brooklyn, and Forty-second street, Manhattan. The work, which is well under way, is estimated to cost between $150,000 and $200,000.

Contracts are about to be let for all the masonry and structural steel work necessary to bring the new Custom House building up to the street level. The general contract for building above that will be let within 90 days after the foundation work. Mr. Cass Gilbert is the Architect.

The Manhattan Ry. has filed plans with the Department of Buildings for three substations for the East Side divisions. One will be in Division street, near the corner of Allen; another at the southwest corner of Third avenue and Ninety-ninth street, and the third in Thirty-fourth street, just west of Second avenue. They will be five stories high, and each will cost $28,000.

NORFOLK, VA.—The Norfolk & Western has made application to the Board of Harbor Commissioners for permission to build extensions to its piers.

PASSAIC, N. J.—The D., L. & W. has plans for a passenger station on Passaic avenue. It will be 400 ft. long, of brown stone and brick. (June 15, p. 406.)

PITTSBURGH, PA.—The National Tube Co. will build an addition to their Second avenue pipe mill.

TARA, IOWA.—The Illinois Central will build a roundhouse and coal chutes at Tara.

TOPEKA, KAN.—Reports state that bids for the new Atchison, Topeka & Santa Fe blacksmith shop and foundry will be asked at once, and that the contract will probably be let in the middle of August. The building will be of brick and stone, 80 x 160 ft.

WINONA, MINN.—The Chicago, Milwaukee & St. Paul proposes to build a freight depot 200 ft. long and 40 ft. wide.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.

The Engineering and Maintenance of Way Association.

A number of members of the American Railway Engineering and Maintenance of Way Association have expressed a desire for a semi-annual or Fall meeting. It has therefore been determined to ascertain the views of the individual members of the association as to the desirability of holding a semi-annual meeting, and also their preference as to the time and place for holding such meeting.

Programme of the International Railroad Congress, Paris.

September 18, 19 and 20, 1900.—From 11 a. m. to 2 p. m.: Enrollment of members of the Sixth Session of the Congress and preparation of the lists of sections.

September 20.—From 11 a. m. to 2 p. m.: Reception of delegates by the International Commission. At 3 p. m.: Formal opening of the Sixth Session of the Congress. Election of the President and officers. At the end of the general session each section will assemble under the temporary presidency of one of the members of the International Commission to complete its organization.

September 21 and 22.—Meetings of the sections at 9 a. m. and 2 p. m.

September 24.—Meetings of the sections at 9 a. m. and 2 p. m. At 7:30 p. m.: Banquet given by the French Railroad Lines.

September 25.—9 a. m.: Meeting of the sections. 1 p. m.: Excursion to the Chateau de Chantilly. Private view of Condé Museum.

September 26.—9 a. m. and 2 p. m.: Meeting of the sections.

September 27.—9 a. m.: Meeting of sections. 2 p. m.: General meeting. 8 p. m.: Entertainment given by the French Railroad Lines.

September 28.—9 a. m.: Meeting of the sections. 2 p. m.: General meeting.

September 29.—9 a. m.: Meeting of the sections. 2 p. m.: General meeting and conclusion of the Congress. 8:30 p. m.: Reception to the members of the Congress by the Minister of Public Works on behalf of the Government.

Throughout the term of the session excursions to points of interest will be organized by the French railroads. The programme of these will be made known later by the French General Committee through the International Committee.

Master Car and Locomotive Painters' Association.

The thirty-first annual meeting of this association will be held at Detroit, Mich., on the 11th, 12th, 13th and 14th days of September, 1900, opening at 9 o'clock a. m., Tuesday, the 11th. The official headquarters will be at the Cadillac Hotel, and where the convention will be held. The following programme will be presented at the convention:

1. "Relative Hygiene; Its Costs and Compensation," Dr. P. G. Conn.
2. "The Best Method of Conducting Tests to Determine the Relative Merits of Various Materials Used in Painting Railroad Equipment," F. S. Ball, Pennsylvania R. R., Altoona, Pa.; C. E. Copp, Boston & Maine R. R., Lawrence, Mass.
3. "The Best Method of Painting Locomotives; Also the Proper Method of Keeping Paint on Locomotives in Good Condition," Chris. Clark, New York, Chicago & St. Louis Ry., Chicago, Ill.; W. M. Joyce, Baldwin Locomotive Works, Philadelphia, Pa.; C. A. Cook, Philadelphia, Wilmington & Baltimore R. R., Wilmington, Del.
4. "The Best Method and Material for the Hardwood Surface of the Car Interior," Chas. E. Koons, St. Louis Car Co., St. Louis Mo.; John T. McCracken, Jackson & Sharp Co., Wilmington, Del.; C. A. Bruyere, Canada Atlantic R. R., Ottawa, Ont.
5. "The Railway Master Car and Locomotive Painter," Samuel Brown, New York, New Haven & Hartford R. R., Boston, Mass.
6. "Is Terminal Cleaning, Where Thoroughly Practiced, a Factor in Paint Shop Economy?" J. A. Gohen, Cleveland, Cincinnati, Chicago & St. Louis R. R., Indianapolis, Ind.; B. E. Miller, Lehigh Valley R. R., Scranton, Pa.; A. R. Lynch, Pittsburgh, Cincinnati, Chicago & St. Louis R. R., Dennison, O.
7. "Can a New Wood Head Lining Be Prepared so as to Prevent Decay of Filler, Grain Raising, Etc.? If so, Give Method of Preparation," E. A. Cole, J. G. Brill Car Co., Philadelphia, Pa.; W. H. Dutton, Lehigh Valley R. R., Sayre, Pa.
8. "Does Burning Off Old Paint Have an Injurious Effect Upon the Surface or Upon the Future Painting?" Henry Block, Cleveland, Cincinnati, Chicago & St. Louis R. R., Brightwood, Ind.; J. A. P. Glass, Yazoo & Mississippi Valley R. R., Vicksburg, Miss.; Robert Shore, Lake Shore & Michigan Southern R. R., Cleveland, O.
9. "Uniform System of Freight Car Stenciling," J. H. Kahler, Erie R. R., Meadville, Pa.; W. O. Quest, Pittsburgh & Lake Erie R. R., McKees Rocks, Pa.; R. W. Scott, Seaboard Air Line R. R., Portsmouth, Va.
10. "Paint Shop Records and Accounts," W. T. Canan, Pennsylvania R. R., Tyrone, Pa.; F. G. Schaefer, Wheeling & Lake Erie R. R., Toledo, O.

Various queries.

PERSONAL.

(For Other personal mention see Elections and Appointments.)

—Mr. George Follett, for many years Assistant Treasurer of the Northern Pacific in the New York office, died at his home in Brooklyn, Aug. 3, at 70 years of age.

—Mr. W. H. Brooker, President and General Manager of the Sabine Pass & Northwestern, a new line proposed in Texas, died in New York City Aug. 1.

—Col. L. D. Richardson, Superintendent of the Hot Springs Railroad for the past 12 years, died at Hot Springs, Ark., Aug. 4. He was 76 years of age.

—Mr. Clark L. Pierce, General Superintendent of the Rutland Railroad, and the Ogdensburg & Lake Cham-

plain, died at Rutland, Vt., August 6. He was 40 years of age.

—Maj. Benjamin S. Henning, organizer of the Henning Rapid Transit system for tunneling the East and North rivers, New York, died at his home in New York City Aug. 6, in his seventy-third year.

—Prof. Dascom Greene, for many years a member of the faculty of the Rensselaer Polytechnic Institute, died at his home in Troy on Monday night, aged 75. He will be mourned by engineers all over the world.

—Mr. D. Crombie, Superintendent of Transportation of the Pere Marquette at Detroit, Mich., was born in 1864. He began railroad service in 1882 as a telegraph operator, and served for 12 years with the Grand Trunk and the Flint & Pere Marquette as agent, train despatcher, car distributor; then until 1899 he was Car Service Agent for the Flint & Pere Marquette, which now forms a part of the Pere Marquette system.

—It is with regret that we announce the sudden death in Japan, Aug. 4, of Mr. Tsunetaro Uyeda, manager of the railroad department of Mitsui & Co., New York. Mr. Uyeda left here early in June for a short combined business and pleasure trip. Those who were fortunate enough to enjoy a personal acquaintance with Mr. Uyeda will recall his uniform courtesy toward those with whom he came in contact in transacting the American business of the largest railroad systems of Japan. While this quality is characteristic of the Japanese, it was especially impressive in Mr. Uyeda. His death is a distinct loss to the company that employed him.

—Mr. W. C. Winter is Superintendent of the new Wisconsin Division of the Chicago, St. Paul, Minneapolis & Omaha. He entered railroad service in July, 1893, as a clerk in the Traffic Department of the company with which he is still connected, and has served as Traveling Auditor since September, 1894; Assistant Claim Agent since January, 1896; Chief Clerk in the General Superintendent's office since February, 1898; Assistant Superintendent of the St. Paul & Sioux City Division since November, 1898; Division Superintendent of the Northern Division since September, 1899, and Division Superintendent of the Wisconsin Division since July, 1900.

—Mr. F. P. Abercrombie, Superintendent of the Amboy Division of the Pennsylvania Railroad, was born at Fort Towson, I. T., January 2, 1854. He entered railroad service with the Pennsylvania in January, 1874 at Altoona, Pa., and has since been continuously with that company. He has acted as engineer on construction, Assistant Supervisor of the New York Division; Supervisor of the Baltimore & Potomac, and of the West Jersey & Atlantic; Assistant Engineer of the West Jersey, of the Sunbury & Shamokin Division and of the Eastern and Susquehanna Divisions; Superintendent of the Bedford Division of the Cambria & Clearfield, and now of the Amboy Division.

—Mr. De Witt Clinton Haskin died in Buffalo, N. Y., July 17. Mr. Haskin is known to our readers as the designer and promoter of the Hudson River tunnel, which received a great deal of attention at one time. Mr. Haskin was born in Pittstown, N. Y., in April, 1824. His father went to live in Dayton, Ohio, from which place Mr. Haskin went to California in 1849. There he gradually became the owner of a hotel, and by 1856 had come to be a man of some wealth. Then he returned East overland, and went back to California in 1858, where he began to build the California Pacific Railroad, connecting the city of Marysville with San Francisco with a branch to Sacramento. Obviously, the difficulties were very great, as the material of construction had to be taken around Cape Horn, and our Civil War made it hard to finance such undertakings. The railroad was finished in 1869, and was bought by the Central Pacific. Mr. Haskin went to Utah, and in 1872, having sold a portion of his ownership in the famous Emma Mine, he came to New York and almost at once began the work of building the Hudson River tunnel. As the reader knows, that project was never completed, but its present owners have plans on hand for finishing and working at least one of the two tubes.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The position of Assistant General Passenger Agent held by the late Charles A. Higgins has been abolished, and the correspondence of that office goes to the General Passenger Agent.

Atlantic, Valdosta & Western.—Olin P. Love has been appointed General Agent, with office at Jacksonville, Fla.

Baltimore & Ohio.—The following appointments of Superintendents have been made under the reorganized divisions: Pittsburgh Division, Eastern District, J. S. Norris, with office at Connellsville, Pa.; Pittsburgh Division, Western District, John Barron, Pittsburgh, Pa.; Northwestern Division, Chicago District, F. C. Batchelder, Garrett, Ind.; Northwestern Division, Akron District, J. H. Glover, Chicago Junction, Ohio; Monongahela Division, H. G. Bowles, Fairmount, Va. Under division changes in Western Maryland and in West Virginia, Keyser, W. Va., is to be the terminal of the Eastern Division, instead of Grafton. Other terminals of the division are Fairmont on the main line; Clarksburg on the Parkersburg branch, and Philippi on the Bloomington branch. The shops at Grafton are to be removed to Fairmont.

Boston & Maine.—Wm. J. Hobbs, General Auditor, has had the title of Comptroller added, and takes charge of the Treasury and Accounting Departments. J. W. Richards is appointed Assistant General Auditor. M. T. Donovan, General Freight Agent, is appointed Freight Traffic Manager, and A. S. Crane, Export Freight Traffic Manager. Mr. Donovan and Mr. Crane will report directly to the Second Vice-President. All the above officers are at the Union Station, Boston. Effective August 1.

Brainerd & Northern Minnesota.—The general offices have been removed from Minneapolis to Brainerd, Minn. W. H. Gemmell, in addition to his office of General Manager, has been elected Vice-President. G. D. Ball has been appointed Engineer Maintenance of Way at Brainerd, succeeding W. C. Smith, Chief Engineer.

Buffalo, Rochester & Pittsburgh.—Acting Superintendent J. C. Hyde has been appointed Superintendent of the Pittsburgh Division, with headquarters at Butler, Pa.

Canadian Pacific.—J. H. Thomson has been appointed Freight and Passenger Agent at Baltimore, Md., succeeding C. G. Osburn.

Chattanooga & Durham.—The officers of this company are President and Traffic Manager, C. B. Wilburn; Secretary and Cashier, W. E. Huff; Auditor, T. J. Manson, all with offices at Rome, Ga.

Chicago & Northwestern.—S. A. Hutchison, Assistant General Passenger Agent of the Union Pacific, has been appointed Manager of the Tourist Department of the C. & N. W., with headquarters at 176 Washington street, Boston, Mass.

Chicago, Milwaukee & St. Paul.—F. A. Miller, now Assistant General Passenger Agent, will succeed G. F. Heafford as General Passenger Agent at Chicago upon the retirement of Mr. Heafford in October.

Colorado & Northwestern.—S. B. Dick has been elected Vice-President, with office at Meadville, and Frank May, Secretary, with office at Girard, Pa. Charles B. Culbertson, formerly Secretary, Treasurer and General Manager, is now Treasurer and General Manager.

Colorado & Southern.—S. L. Rainey is appointed Superintendent of the Trinidad and New Mexico divisions, succeeding F. C. Webb, resigned.

Copper Range.—W. A. Paine, recently elected President, has resigned to accept the position of General Superintendent of Construction of the United States Life Saving Service, Atlantic and Lake Coast region, with office in New York city.

Deckerville, Osceola & Northern.—W. A. Beatty has been appointed Assistant General Manager, with headquarters at Deckerville, Ark.

Denver & Rio Grande.—The appointment of W. D. Lee as Acting Superintendent of the Second and Third divisions, noted last week, is to continue only during the absence of R. M. Ridgway, who is away on sick leave.

Detroit & Lima Northern.—Frank Ferris has been appointed General Freight and Passenger Agent, with office at Detroit, Mich., succeeding C. A. Chambers, resigned.

Great Northern.—W. B. Scott, Superintendent of the Cascade Division at Everett, Wash., has been transferred to the Montana Division at Havre, Mont. He is succeeded by M. J. Jones.

Gulf, Beaumont & Kansas City (Atchison System).—George B. Gallon, Special Traveling Accountant of the Atchison, Topeka & Santa Fe, has been appointed Auditor on the G., B. & K. C., succeeding F. A. Helbig, resigned.

Iowa Central.—J. N. Tittemore will continue as General Traffic Manager at Marshalltown, Iowa, under the new management.

Kansas City, Mexico & Orient.—W. P. Robinson, late General Manager of the St. Joseph & Grand Island, has been elected President of the Kansas City, Mexico & Orient Construction Co., which has in charge the building of this line.

Kansas City Southern.—Stuart R. Knott, First Vice-President of the Plant System, has been elected President of the K. C. S. A. R. Dillon succeeds R. C. Hubbell as Purchasing Agent.

Kentucky Western.—The officers of this company, whose line is now building, are: President and General Manager, Irving H. Wheatcroft, Dixon, Ky.; Vice-President, G. J. Atkins, Chicago; Secretary, F. A. Siefert, St. Louis, Mo.; Auditor, W. O. Horr, Dixon; Chief Engineer, Charles A. Denham, Dixon; Superintendent of Construction, C. G. Brosnahan, Dixon.

Lake Tahoe Railway & Transportation.—J. U. Haley has been appointed General Freight and Passenger Agent.

Minneapolis & St. Louis.—E. T. Campbell is appointed Purchasing Agent, succeeding S. M. Lohren, resigned. Effective August 6.

Missouri, Kansas & Texas.—W. E. Williams has been appointed Car Accountant at Dallas, Tex., succeeding R. H. Weddle.

Newburgh & South Shore.—A. T. De Forest has been elected President; A. S. Chisolm, Vice-President, and A. H. Garry, Auditor.

Ohio Southern.—Charles D. McKelvey, formerly General Superintendent of the New York, Susquehanna & Western, has been appointed General Superintendent of the O. S., with headquarters at Springfield, Ohio.

Oregon Railroad & Navigation.—H. M. Adams, in addition to his duties as General Agent at Spokane, Wash., is appointed Superintendent of the Spokane Union Depot.

Pawnee.—H. R. Davis is General Manager; E. W. Clifford, Superintendent, Auditor and General Freight and Passenger Agent; C. E. Clayton, Secretary, all with offices at Pawnee, Ill.

Pennsylvania.—J. P. Orr, General Freight Agent of the Northwest System of the Pennsylvania Co. at Pittsburgh, Pa., has been appointed General Freight Agent of the New Castle Division of the P. R. R. H. N. Bradley is appointed Division Freight Agent, with office at Erie, Pa. J. W. Stone, Supervisor of the Schuylkill Division, becomes Supervisor of the New York Division, United Railways of New Jersey. He is succeeded by R. V. Massey, Assistant Supervisor of the Middle Division, who in turn is succeeded by E. S. Hippey, Assistant Supervisor of the Middle Division of the Philadelphia & Erie.

Peoria & St. Louis.—The officers of the company, which proposes to build a new line, are: President, Nathaniel M. Jones; Secretary, Wm. Spooner, both with offices at 710 New York Life Building, Chicago.

Philadelphia & Reading.—M. F. D. Scanlan, Division Engineer at Harrisburg, Pa., has been made Engineer of the Atlantic City Division, with headquarters at Camden, N. J.

Plant System.—Morton F. Plant, son of the late H. B. Plant, on July 31 was elected Vice-President of all the roads of the system, with the exception of the Alabama Midland, to succeed S. R. Knott, resigned. F. Q. Brown, Second Vice-President of the Plant System, was elected Vice-President of the Alabama Midland. With the retirement of Mr. Knott reports of general officers will be made direct to the President.

St. Johnsbury & Lake Champlain.—H. E. Folsom has been elected Vice-President in addition to his duties as Superintendent. George F. Nowell, formerly Paymaster, has been made Assistant Cashier.

St. Joseph & Grand Island.—F. T. Slayton is appointed Master Mechanic of this company and the Kansas City & Omaha at St. Joseph, Mo., succeeding A. C. Hinckley, resigned.

Seaboard Air Line.—N. E. Lugoff has been appointed First Assistant Chief Engineer, and B. F. Mackall has been appointed Assistant Chief Engineer, both with headquarters at Portsmouth, Va. C. Y. Williams has been appointed Assistant Superintendent of the Fifth Division.

South St. Paul Belt.—Thomas Munn, Jr., formerly with the Pittsburgh Bridge Co., has been elected a director and Superintendent of the S. St. P. B., with office at South St. Paul, Minn.

Tennessee Northern.—N. Riddick has been appointed General Passenger and Freight Agent at La Follette, Tenn.

Tifton, Thomasville & Gulf.—S. Z. Ruff is Acting Superintendent; W. F. Rudisill, General Freight and Passenger Agent and Acting Auditor, both with offices at Thomasville, Ga. J. J. Anderson is Master Mechanic, with office at Moultrie, Ga.

Toledo, St. Louis & Western.—The following officers are announced for this company, successor to the Toledo, St. Louis & Kansas City: President and General Manager, Benjamin Norton; General Superintendent, Chas. F. Franklin, succeeding J. W. Sherwood; General Traffic Manager, C. D. Whitney; General Passenger Agent, C. C. Jenkins; Assistant General Freight Agent, Thomas J. Clark; Assistant Secretary and Assistant Treasurer, M. L. Crowell; Acting General Auditor, E. O. Reed; Superintendent of Telegraph, Purchasing Agent and Chief Clerk to the President, Niel McKinnon. Several of these men held similar positions with the old company.

Vera Cruz & Pacific.—Sheldon T. Bent, General Superintendent, Chief Engineer and Purchasing Agent, who was granted two months' leave of absence in May, has resigned. The offices of General Superintendent, Construction Engineer and Commercial Agent are abolished. F. C. Englesing, Construction Engineer, is appointed Chief Engineer. J. W. Gillespie, Commercial Agent and Acting Purchasing Agent, is appointed General Freight Agent and Purchasing Agent. L. C. Butler, Accountant, is appointed Auditor. Effective July 1.

Waycross Air Line.—George D. Wadley has been elected Vice-President and General Manager, with headquarters at Waycross, Ga.

Wheeling & Lake Erie.—The office of W. P. Schaufele, Superintendent of Car Service, has been removed from Canton, Ohio, to Cleveland.

Willmar & Sioux Falls (Great Northern).—F. R. Rogers has been appointed General Freight and Passenger Agent, with headquarters at Sioux City, Ia., succeeding W. B. McNider.

Wisconsin & Michigan.—W. G. Tait has been appointed Purchasing Agent, with headquarters at No. 222 Grand Central Passenger Station, Chicago, Ill.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALGOMA CENTRAL.—The company is reported to have obtained the rights of the old Hudson Bay & Sault Ste. Marie Co., which was organized some years ago to build a line from the Algoma Central road at Missanabie, Ont., north about 250 miles to Moose Factory on Hudson Bay. The charter carries with it a subsidy of $500,000 and 1,250,000 acres of land. Work is to be begun as soon as the line is completed to Missanabie.

Porter Bros., of Spokane, Wash., have taken a subcontract for 50 miles of grading, and 100 miles of bridging on the line from Sault Ste. Marie north toward Dalton. Foley Bros., of St. Paul, Minn., have the general contract. (July 20, p. 502.)

AMERICAN-MEXICAN PACIFIC.—Phoenix, Ariz., press reports state that a new company is to be formed to build the road projected under this title from Phoenix southwest 1,050 miles, via Florence and Tucson, Ariz., and Sonora and Sinaloa, Mex., to Jalisco, on the Baranderas Bay, with branches. The new organization is to be called the American-Mexican Commercial Ry. Co., and it is proposed to issue capital stock to the extent of $55,000,000. Mrs. Velasquez Beard is the promoter. Much of the preliminary surveys is reported completed. (Construction Supplement, July 27, 1900.)

ANN ARBOR.—Improvements are in progress on the roadbed from Mount Pleasant to Copemish, Mich., 104 miles.

ATCHISON, TOPEKA & SANTA FE.—Surveys are in progress for the proposed extension of the Somerville-Conroes branch east through Texas to a connection with the Gulf, Beaumont & Kansas City, recently acquired. (Aug. 3, p. 531.)

ATLANTIC COAST LINE.—An officer writes that work is not yet begun on the improvements at Emporia, Va. The work involves the building of three miles of track, all tangent, eliminating 154° of curvature and 850 ft. of distance, and reducing the maximum grade to 0.6 per cent. The work includes two small bridges and three culverts. The special feature will be a cut one mile long containing about 100,000 cu. yds., and a fill of about the same length containing 75,000 cu. yds. (Construction Supplement, July 27, 1900.)

BALTIMORE & OHIO.—Arrangements are reported completed with the Pennsylvania for building about six miles of branch coal lines in Westmoreland County, Pa.

BEAUMONT WHARF & TERMINAL.—Application was made July 31 to the Texas State Railroad Commission for authority to issue $600,000 in bonds for terminal improvements and extensions. (Construction Supplement, July 27, 1900.)

BEAVER DAM.—This company has been incorporated in Tennessee, with a capital stock of $10,000, to build a railroad from a point on the State line in Johnson County, near Damascus, Va., to run along Beaver Dam Creek to a point in the lower end of Shady Valley near the plant of the Empire Lumber & Milling Co. The incorporators are: E. Butler, R. E. Donnelly, E. E. Parry, W. T. Smythe, H. A. Donnelly and J. E. Butler.

BELAIR & HAVRE DE GRACE.—Surveys are reported in progress for the line from Belair, Md., east about 15 miles to Havre de Grace. John H. Reckford, of Belair, is President. (Construction Supplement, July 27, 1900.)

BIRMINGHAM, SELMA & NEW ORLEANS.—Grading is reported begun on the proposed extension from Martins,

Ala., to Thomasville, 15 miles. F. M. Abbott, of Abbott, Miss., is President. (July 13, p. 487.)

CANADIAN PACIFIC.—Surveys are completed, and building is to be begun at once on the line from Golden, B. C., on the main line, to Sand Creek, on the Crow's Nest Pass Line. (Aug. 3, p. 531.)

CHICAGO & NORTHWESTERN.—Right of way is being secured, according to report, for a branch from Interior, Mich., north 25 miles to Mass City, terminus of the Copper Range.

CHICAGO, MILWAUKEE & ST. PAUL.—Preliminary surveys are made for the extension from the main line at Random Lake, Wis., to run northeast 15 miles to Sheboygan. (Construction Supplement, July 27, 1900.)

Efforts are being made to induce the company to build a branch along the Peshtigo River from Ellis Junction, Wis., northwest about 30 miles to connect with the Minneapolis, St. Paul & Sault Ste. Marie in the northern part of Marinette County.

GRAND TRUNK.—Rodgers & Taylor, of Montreal, have the contract for double-tracking between Niagara Falls and Hamilton, Ont., 40 miles, and building is to be begun at once. (Construction Supplement, July 27, 1900.)

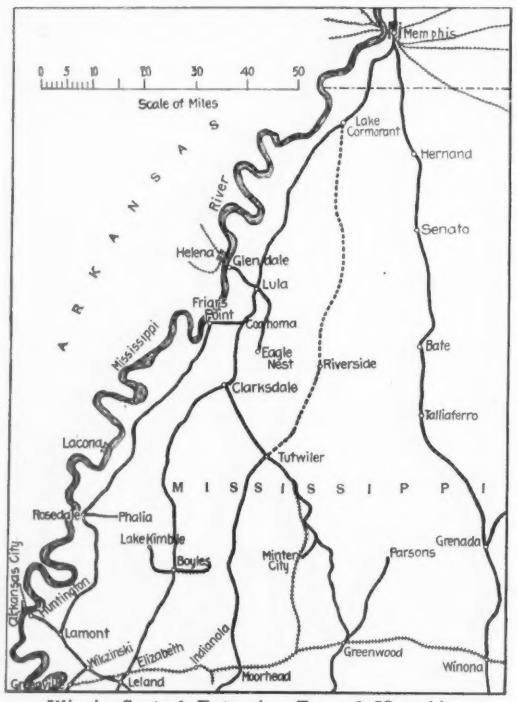
GREAT NORTHERN.—The company is considering a new route for its extension from Wenatcher, Wash., north up the Columbia to the Republic mining country. It is stated that the San Poil survey has been abandoned. (April 6, p. 228.)

GREAT NORTHERN OF CANADA.—Ross, Barrie & McRae have taken the contract for the Joliette Branch, which will bring the line into Montreal over a bridge to be built over the River Des Prairies at the east end of Montreal Island.

GULF COAST.—Work is to be begun soon, according to report, on the electric line under this title from Biloxi, Miss., to Pass Christian, 32 miles. W. L. Covel, of Biloxi, is General Manager.

GURDON & FORT SMITH.—Bids are being received for building the first 35 miles of this line, which is to run from Gurdon, Ark., on the Missouri Pacific, northwest through Shawmut. Wm. Grayson, Wainwright Bldg., St. Louis, Mo., is President. (Construction Supplement, July 27, 1900.)

ILLINOIS CENTRAL.—The extension from Tutwiler, Miss., now building, is to run north 67 miles via Riverside to Lake Cormorant, 21 miles south of Memphis, where connection is made with the Yazoo & Mississippi Valley line into Memphis. The entire line is located, and



Illinois Central Extension Toward Memphis.

the company is building from Tutwiler to Riverside, 20 miles. Of this section six miles was graded last year. The work is under the direction of J. N. Darling at Tutwiler. (Construction Supplement, July 27, 1900.)

JAMESTOWN & CHAUTAUQUA.—Vandergrift & Co., of Philadelphia, have the contract for the extension from Mayville, N. Y., to run northwest about seven miles to Westfield. Building is to be completed by May 1, 1901. (July 6, p. 472.)

KENTUCKY ROADS.—A Baltimore syndicate may build a railroad to connect coal lands near Barboursville with the Louisville & Nashville. Riddell & Sprout, of Barboursville, are interested.

LAKE ERIE & WESTERN.—Extensive improvements are proposed at the Indianapolis, Ind., terminals.

LAKE SHORE & MICHIGAN SOUTHERN.—It is proposed to extend the Pittsburgh, McKeesport & Youghiogheny Division of the Pittsburgh & Lake Erie from New Haven, Pa., to the coke works of W. J. Ranney at Mount Braddock, and thence to the coal fields near Masontown.

MANHATTAN (ELEVATED).—Plans have been filed for a stone retaining wall 20 ft. high and 6 ft. wide, to be built on La Fontaine avenue, Third avenue, 179th and 181st streets, New York. The enclosure will be used for the storage of cars on the Fordham extension, now building.

MASSENA TERMINAL.—The New York State Railroad Commissioners have granted authority to this company to build a steam road about two miles long, to connect with the power plant of the St. Lawrence Power Co. at Massena. This is probably the same line provided for in the incorporation of May 2, and which, according to an officer of the company, is already completed. (May 18, p. 329.)

MEXICAN CENTRAL.—Improvements are to be made at Guadalajara, Mexico, to cost about $150,000. The company is building from that point south toward Manzanilla.

MISSISSIPPI RIVER, COLESBURG & MANCHESTER.—Dacey & Co., of Boston, Mass., have the contract for building this line from Colesburg, Delaware County, Ia., southeast 18 miles to Dyersville. Building was to be begun about August 1. W. C. Kirchheck, of Colesburg, Ia., is Secretary. (Construction Supplement, July 27, 1900.)

NEW YORK CONNECTING.—Surveys are in progress on this double-track line from the Port Morris Branch of the New York Central, in the Borough of the Bronx, New York city, to run southeast 7½ miles across Randall's and Ward's islands, and through Astoria, L. I., to the Long Island R. R. at Bushwick Junction. It will require over three miles of bridges and viaducts. Oliver W. Barnes, of 55 Broadway, New York, is the general contractor. Alfred P. Boller is President and Chief Engineer. (Construction Supplement, July 27, 1900.)

ONTARIO ROADS.—The Cataract Power Co. has made a proposition to the city of Hamilton that if the company be granted right of way through the city, it will build within two years a first-class electric line from Hamilton to Galt, and run 12 trains daily each way. The company guarantees that the rates shall never exceed one-third of the present rates between the towns on steam roads.

OREGON RAILROAD & NAVIGATION.—Contractors are reported investigating preparatory to making bids for a cut-off between Pendleton, Ore., and Umatilla. A survey has been run from Echo to Castle Rock, which will cut off about 13 miles and avoid a number of heavy grades.

PENNSYLVANIA.—Arrangements are reported under way for important improvements on the Western New York & Pennsylvania line recently acquired into Buffalo.

PENNSYLVANIA CO.—Right of way is reported being bought for another track from Bucyrus, Ohio, west, and it is stated that building is to be begun at once.

ST. LOUIS & MEXICAN.—The very extensive project of this company includes a line from St. Louis, Mo., southwest to Fort Smith, Ark., and thence southwest about 550 miles to Spofford, Tex., where connection will be made with the Southern Pacific for Mexican points. It is stated that immediate steps will be taken for building the sections in Texas between Montague and Bowie, on the Chicago, Rock Island & Pacific, and between Strawn and Brownwood, on the Atchison, Topeka & Santa Fe.

SAVANNAH UNION STATION.—Application has been made in Georgia to incorporate this company to build a union station and terminals at Savannah, Ga. The railroad proposed aggregates about eight miles. Cecil Gabbett (Division Superintendent of the Seaboard Air Line) and Wm. H. Mackall, of Savannah, are interested.

SHAWMUT CONNECTING.—This company was incorporated in New York State August 1, with a capital stock of $50,000, to build a railroad from a point on the Pittsburgh, Shawmut & Northern at the state line, to another point on the same road in Genesee, Allegheny County. The directors are: Henry S. Hastings, Frank S. Blair and D. D. Dickson, of Angelica. This is probably an incorporation of the Pittsburgh, Shawmut & Northern.

SHAWNEE, OKLAHOMA & INDIAN TERRITORY.—Surveys are completed nearly to Sherman, Tex., on this proposed line from Wichita, Kan., south via Shawnee, Okla., to Denison, Tex. Contracts will be let soon. C. N. Points of Shawnee, Okla., is President. (Construction Supplement, July 27, 1900.)

SOUTHERN INDIANA.—Right of way has been secured to the Union Station at Terre Haute, Ind., for the new line recently built to that city. This gives the company direct connection with the Chicago & Eastern Illinois into Chicago.

STUTTGART & ARKANSAS RIVER.—The people of Stuttgart, Ark., have raised between $4,000 and $5,000 for the proposed extension from Stuttgart to a connection with the Searcy & Des Arc, about 35 miles. (Construction Supplement, July 27, 1900.)

TENNESSEE CENTRAL.—Location is completed, according to report, on a branch line from Johnsonville, Tenn., to the coal lands of the Campbell Coal Co., Atlanta, Ga., near Woody, Tenn., nine miles.

UNION PACIFIC.—Wyoming press reports state that the company is to begin building a new line between Evanston, Wyo., and Salt Lake City, Utah, eliminating the steep grades of Echo Canyon and placing Ogden on a branch line. Surveys are reported completed and some of the contracts made.

GENERAL RAILROAD NEWS.

ATCHISON, TOPEKA & SANTA FE.—The statement of earnings on 7,342 miles for the year ended June 30, 1900, against 7,033 miles for the preceding year, shows the gross earnings for this year at $46,232,079, against $40,513,499, a gain of $5,718,580. The net earnings this year were $18,710,579, against $12,906,817 last year, a gain of $5,803,762. After subtracting taxes and rentals and the fixed charges, there was left a balance this year of $9,684,286, from which 5 per cent. has been paid on the preferred stock amounting to $5,700,000, which leaves a surplus of $3,984,286.

BALTIMORE & OHIO.—The directors on August 2 declared a regular semi-annual dividend of 2 per cent. on the preferred stock, and also two semi-annual dividends of 2 per cent. each on the common stock, payable September 4, 1900, and March 1, 1901. This is the first dividend on the common stock since the reorganization. There was no common stock dividend paid by the old company after the last quarter of 1894.

BANGOR & PORTLAND.—The Delaware, Lackawanna & Western took possession of this property August 1. The operation for the present will be substantially as heretofore. (July 20, p. 502.)

BRAINERD & NORTHERN MINNESOTA.—The Northern Pacific is reported to have entered into a close traffic arrangement with this company for the transportation of about 10,000,000 ft. of logs from the timber camps. Western reports state that the Northern Pacific is attempting to obtain control of the property.

BUFFALO & SUSQUEHANNA.—Seventy-five bonds, series A, for $1,000 each, and five bonds, series B, for $500 each of the first mortgage 5 per cent. gold bonds have been drawn for payment at par and interest by Harvey Fisk & Co., New York, under the recent notice. (July 13, p. 488.)

CHICAGO & ALTON.—Eleven first mortgage bonds of the Mississippi River Bridge Co. have been drawn for redemption October 1 at the company's office, New York.

CHICAGO, MILWAUKEE & ST. PAUL.—The company is negotiating with the Northern Pacific for the use of the N. P. tracks from St. Paul to Duluth.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—The total earnings for the year ended June 30, 1900, were $16,806,851, against $14,719,363 the year before, a gain of $2,087,488. The net earnings this year were $5,057,587, against $4,073,808, a gain of $983,779. After deducting interest, rentals, etc., the balance this year is $2,191,048, from which has been declared dividends of 5 per cent. on the preferred and 3 per cent. on the common, requiring a total of $1,339,634.

COLUMBUS, MARSHALL & NORTHEASTERN.—John Seymour, the contractor for building this road, has entered a suit of foreclosure on this property on a claim of $22,000. The line is projected from Marshall, Mich., north 135 miles to Bay City, and at last report was graded nearly to Olivet. H. E. Hollon, of Marshall, Mich., is President. (Railroad Construction column, October 13, 1899, p. 719.)

DENVER & RIO GRANDE.—The gross earnings for the year ended June 30, 1900, were $10,246,080, against $9,270,240 the preceding year, a gain of $975,840. The net earnings this year were $3,760,240, against $3,559,897 last year, a gain of $200,343. The surplus this year, after deducting fixed charges, rentals, etc., was $1,314,462, from which dividends of 4 per cent. have been declared, requiring $946,000.

HOCKING VALLEY.—Forty-seven Columbus, Hocking Valley & Toledo car trust series A of 1894 have been drawn for redemption at par and accrued interest on October 1 at the Atlantic Trust Co., New York.

LOUISVILLE & ATLANTIC.—Amended articles of incorporation ave been filed with the Kentucky Secretary of State showing the change of the principal offices in Louisville, Ky., to Versailles, Ky., and granting power to build and operate telegraph and telephone lines and to operate an express line. The capital stock is reduced from $2,000,000 to $1,000,000 in shares of $100 each, and the bonded debt is fixed at $1,000,000. (July 27, p. 518.)

LOUISVILLE, EVANSVILLE & ST. LOUIS.—The receiver has been authorized by the U. S. Court to refund $80,000 of receivers' certificates issued May 23, 1898, and due August 13, 1900. (July 20, p. 502.)

METROPOLITAN (NEW YORK CITY.)—The New York State Board of Railroad Commissioners on August 6 approved the application for an increase of capital stock from $45,000,000 to $52,000,000. A part of the proceeds will be used to change from cable to underground electric on Columbus avenue, Broadway and Lexington avenue, and from horse-power to electric storage battery on Thirty-fourth street cross-town line. These improvements will cost about $3,000,000, and the remaining $4,000,000 will be used to pay the floating indebtedness and for stocks of other street surface companies in New York city.

NEW ORLEANS & WESTERN.—The Reorganization Committee, of which Stephen Peabody, New York, is Chairman, has adopted certain changes in the reorganization plan of August 1, 1899. Holders of bonds are requested to deposit the same with the Colonial Trust Co., New York, on or before September 3. (September 1, 1899, p. 620.)

NEW YORK, SUSQUEHANNA & WESTERN.—Twenty-five Susquehanna Connecting bonds have been drawn for payment by the Metropolitan Trust Co., New York, on September 1, at $1,050 per bond.

PANAMA.—Holders of first mortgage bonds dated August 1, 1897, are notified that proposals will be received at the Central Trust Co., New York, at 105 and accrued interest, for as many of the bonds as $150,000 will buy. (April 13, p. 246.)

PEORIA & MATTOON.—This company was incorporated in Illinois August 4, with a capital stock of $4,500,000, to take over the section of the Peoria, Decatur & Evansville from Peoria to Mattoon. Notice was recently given in this column of the incorporation of the Mattoon & Evansville to take over the other section of the road from Mattoon to the Indiana State line. The incorporators of both companies are connected with the Illinois Central. (M. & E., July 20, p. 502.)

PEORIA, DECATUR & EVANSVILLE.—Judge Allen has allowed the appeal of certain stockholders who are attempting to re-open the foreclosure suit. (July 13, p. 488.)

PITTSBURGH, BINGHAMTON & EASTERN.—The directors of this company and the Bradford Central on August 6 adopted a resolution for the consolidation of the two companies. This follows a simular resolution by the Wellsboro & Canton Co. the preceding week. These three companies are new organizations which propose to build the line from Ansonia, Pa., east to Binghamton, N. Y., to connect with the Delaware & Hudson. The capital stock is $1,100,000. (Construction Supplement, July 27, 1900.)

ST. LOUIS & SAN FRANCISCO.—Five first mortgage bonds of the old Missouri & Western have been drawn for payment on November 1, at the Mercantile Trust Co., New York, at 105 and interest.

UNION PACIFIC.—The approximate statement of earnings for the year ended June 30, 1900, on the entire system, including the Oregon Short Line and the Oregon Railroad & Navigation, shows gross earnings of $39,238,208, against $34,394,729 last year, a gain of $4,843,479. The net earnings this year were $17,640,777, against $13,942,668 last year, a gain of $3,698,109. The balance applicable to dividends this year was $13,272,065, and from this dividends have been paid in full on the Oregon Short Line A and B incomes; 4 per cent. on the Oregon Railroad & Navigation preferred; the full 4 per cent. on the U. P. preferred, and 3½ per cent. on the U. P. common, leaving a balance of approximately $4,580,687. The directors on July 31 declared the semi-annual dividend on the common stock at the rate of 2 per cent., which was a gain of ½ per cent. over the preceding semi-annual dividend.

VERA CRUZ (MEXICO) RAILWAYS, LTD.—This company was registered in England on July 6 by Norton & Co., 57½ Old Broad street, London, E. C., with a capital stock of £375,000 in £10 shares, of which 12,500 shares are preferred and 25,000 common. The company is to acquire the line from the city of Vera Cruz, Mexico, south 46 miles to Alvarado; also the line from San Juan to Juile, 18 miles; also street railroads in the vicinity of Vera Cruz, and a fleet of steamers and other vessels recently bought from the Vera Cruz River Navigation Co.; also certain lands, piers, etc. W. D. Pearson, Bart., M. P.; L. Camacho and J. B. Body are directors. The central office is at London, 12 Victoria street, S. W.